Entered as second-class matter February 24, 1917, at the Post Office at Lancaster, Pa., under the Act of March 3, 1879.

3 1 1919

OF MICH.

AMERICAN JOURNAL OF PHARMACY

PUBLISHED MONTHLY BY THE

Philadelphia College of Pharmacy

A Record of the Progress of Pharmacy and The Allied Sciences

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VOL. 91 — MAY, 1919 — No. 5

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Price, $3.00 per Annum, in advance. Issued in Monthly numbers of not less than 48 pages. Single Numbers, 30 Cents. Back Numbers, 50 Cents.

Address all communications

For the Editor: To American Journal of Pharmacy, 145 North Tenth Street, Philadelphia, Pa.

For the Business Manager: To Harold J. LaWall, Business Mgr., 145 North Tenth Street, Philadelphia, Pa.

Publication Office—41 North Queen Street, Lancaster, Pa.

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American Journal of Pharmacy

ESTABLISHED IN 1825

Four preliminary numbers were published at different times until in 1829, when the publication of the regular volumes began. Since then the publication has been uninterrupted. During the period from 1829 to 1852 four numbers were published annually, except in 1847, when five numbers were published. From 1853 to 1870 six numbers were published. Since this time twelve numbers have been published annually.

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THE AMERICAN
JOURNAL OF PHARMACY

MAY, 1919

EDITORIAL.

THE REGENERATION OF THE MEDICAL PRACTICES.

Following the greatest of all wars, the world is brought to a realization of the fact that it is confronted by many and most momentous problems. The battles of peace of this post-bellum period of world re-formation, bid fair to have quite as important a bearing upon the destinies of nations and in determining the progress of the world as did the gigantic battles of the war.

Out of this great war and the resulting occurrences there should come, and must come, a better world with a clearer understanding of the just rights and privileges and also the duties of each individual and of each class of citizens as well as of each aggregate of citizens that are deemed a nation. If this be not so, then the victory of this great struggle will be meaningless as guaranteeing the betterment of world conditions. The enormous loss of life entailed, the unprecedented devastation and destruction of property, the untold wealth poured out to attain the war's termination and the innumerable sacrifices made by men and women in all civilized countries, will otherwise all have been very largely in vain.

The problems of this period are so numerous, so far reaching and so important that they cannot be compared with the reconstruction periods following previous wars. They portend the birth of a new order of things, a new era, of actual regeneration for many vocations and for some nations.

Democracy means that each self respecting, intelligent, citizen must assume his full share of responsibility not only for national government but also for national progress, the social, educational, industrial and financial development of his ocuntry. With the

added responsibilities will come improved opportunities for advancement.

Throughout the civilized world, the medical profession as a body generally commands respect and confidence and in the readjustment of industrial, social and political conditions that is now in process, medicine should assume its full responsibility and a position of active leadership.

Modern medical practice differentiates the duties of the physician, the surgeon, the dentist, the veterinary doctor and the pharmacist. Each of these have a distinct professional field and perform separate and necessary services to society. Society relies upon each of these branches and is dependent upon each for faithful performance of duty and, despite the false ideas held by some, they are interdependent upon each other.

Each of these branches of medical practice is based upon a collegiate education in the sciences that, with the granting of a professional degree, assumes that the standing and future actions will be ethical and with proper regard for the professional status of each other and the progress and elevation of all. Yet none of these branches of medical practice have been free from severe criticism because of the continuous and flagrant breaches of professionalism. The commercial spirit has dominated them all to such an extent that only too often have professional ideals become merely a secondary consideration.

They are all honeycombed by false practices and jealousies that are foreign to their codes of ethics. Questionable cults, quackery and chicanery have been engrafted upon medicine and fake remedies and "cure alls" of the vilest type and the numerous queer side lines have queered pharmacy. The misrepresentations and the misleading advertisements of the newspapers, and even appearing in some of our so-called professional journals, have injuriously affected all branches of medical practice. It does not make the violation of the code of ethics any the less, nor does it improve matters the least that the dispensing physician lays the blame for his unethical practices at the door of the counter prescribing apothecary or that the latter attempts to excuse himself because of the former's errors. Such crimination and recrimination is a useless exhibition of a spirit unworthy of professional men and these have no influence whatever in the correction of the faults of either.

In the present attitude of the world for exact justice, for a read-

justment of social conditions, and the demand for better professional service and with the shortage of medical practitioners, there is afforded at this time an unusual opportunity for reform in the medical practices. The various branches of the medical profession should realize that this is the golden opportunity for them to combine their efforts for the eradication of long standing evils and jealousies. Such a regeneration is a need of the time and is essential to the proper advancement of the ethical practice of medicine. It is not a new principle that we are proposing in advocating that selfishness shall cease to be the controlling influence and that in the future these practices shall be swayed by altruistic, yet potential, professionalism. In a recent article Elihu Root declared that "change and growth are the law of life" and this law is applicable to the existence of vocations as well as to that of nations.

Can the leaders in the several medical practices rise to the opportunity and appreciate the possibilities growing out of such a regeneration? It should not be too much to expect of broad minded professional gentlemen that they entertain this proposition with the thought that "the past is behind us, the future is ahead. Let us all strive to make the future better and brighter than the past ever was."

The regeneration advocated is not chimerical but a reformation that is needed and should appeal to all as a perfectly just and feasible proposition. Coöperation will be essential and it must be cooperation of the real earnest and sincere type. It should not be considered at all impractical for the national organizations representing medicine, surgery, dentistry, veterinary medicine and pharmacy each to appoint a representative Committee on Fraternal Relations and to charge these joint committees to act as a commission to define the scope and policy for each branch of medical practice and to study the means of bringing about a closer relation among them and a correlation of their services of eliminating unethical practices and encroachments.

G. M. B.

THE PENNSYLVANIA COLLEGES OF PHARMACY ANNOUNCE ADVANCED ENTRANCE REQUIREMENTS.

The following is a copy of the official letter addressed to the Pennsylvania Board of Pharmacy, advising the Board of the advances in the preliminary education unanimously agreed to be required of students admitted to the pharmacy course in the three schools located within that State. This evidences the intent of these schools to enforce the agreement adopted at the Indianapolis meeting of the American Conference of Pharmaceutical Faculties.

It is hoped that the example thus set by the Pennsylvania schools in this official notice, will be followed by all the schools of pharmacy located in the United States and that by this means ample information will be conveyed to the pharmacists and to the prospective students in pharmacy so that no hardships will result by reason of insufficient preliminary education on the part of those who wish to enter pharmacy. With such ample notice of intended advances, the pharmacists should see that their assistants have the preliminary education required and that any deficiency is made up by study before applying for admission as a student in a pharmacy school.

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145 NORTH TENTH STREET.

April 16, 1919.

DR. L. L. WALTON, *Secretary,*
PENNA. BOARD OF PHARMACY,
WILLIAMSPORT, PA.

Dear Dr. Walton: At a meeting of the deans of the three colleges of pharmacy in this State, recently held in Philadelphia, it was nuanimously decided that the entrance reqirements for pharmacy should be advanced in accordance with the agreement of the colleges belonging to the American Conference of Pharmaceutical Faculties.

The following advances in entrance requirements were therefore agreed upon:

For the sessions of 1919–20 and 1920–21, not less than two years of high school or its equivalent.

For the sessions of 1921–22 and 1922–23, not less than three years of high school or its equivalent.

For the sessions of 1923–24 and thereafter, not less than four years of high school or its equivalent.

It is deemed advisable to give advance notice of this step to the Pennsylvania Board of Pharmacy and to the pharmaceutical journals, in order that pharmacists may prepare for these changes by giving intelligent advice to young men and women contemplating the study of pharmacy so that they may be properly prepared when these changes go into effect.

Very truly yours,

J. A. KOCH,
Dean of the Pittsburgh College of Pharmacy.
JOHN B. MINEHART,
Dean of Dept. of Pharmacy of Temple University.
CHARLES H. LAWALL,
Dean of the Philadelphia College of Pharmacy.

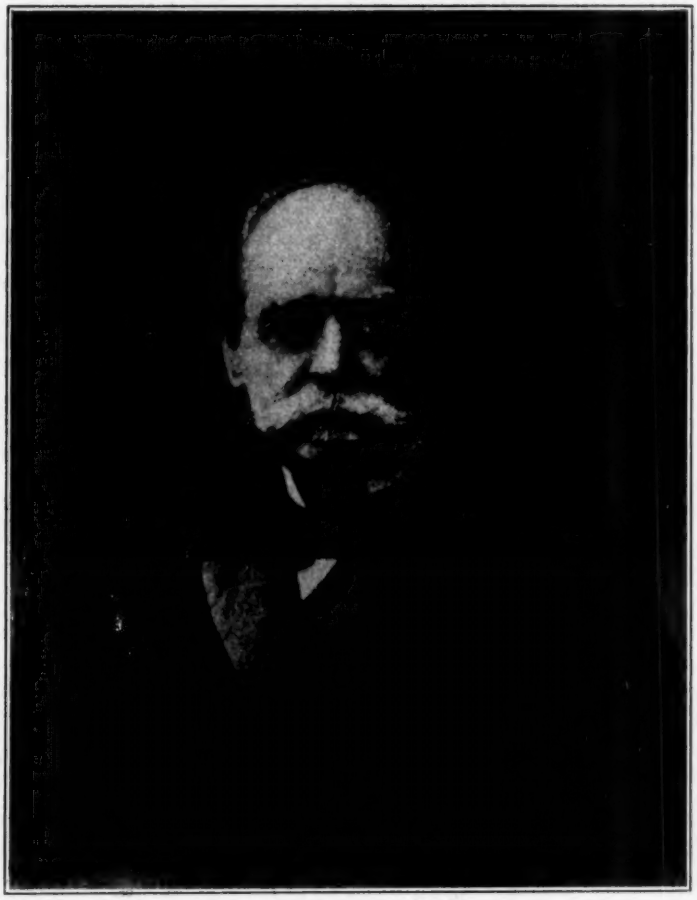
LIFE AND WORK OF CHARLES TANRET.

BY HENRY KRAEMER.

One of the great names in the Hall of Fame in Pharmacy is that of Charles Tanret, a brilliant French pharmacist, who died after a long illness on July 29, 1917. He was a most unselfish and indefatigable investigator. The pursuit of knowledge was the passion of his life. He was a pharmacist like our own William Procter, Jr. Since the time of Sertürner there has not been a more commanding figure. His life is an inspiration in giving us the nature of the qualities which go to make up true success. Notwithstanding his activities as a retail pharmacist and the exactions on his time in the conduct of a retail drug store, he nevertheless found time to publish nearly 100 papers, representing investigations of a very high order of merit. Tanret will long be remembered for his studies on the active principles of ergot and pomegranate bark. His name will also be connected with the test associated with his name for the detection of albumin, peptones and alkaloids.

Charles Tanret was born on August 10, 1847, in the village of Joinville in Haute-Marne, on the Lorraine side of the boundaries of

the Champagne. His preliminary education, especially in the classics, was of a very high order and formed a very definite imprint on his future career. He was also very fortunate in his apprenticeship in the store of M. Antoine. The latter was a well-educated



CHARLES TANRET

pharmacist and took a great deal of personal interest in Tanret, inviting him to his home, directing his reading and instructing him in the science and art of pharmacy. His employer was a man of magnetic personality and so filled his young pupil and apprentice with enthusiasm and with the possibilities of pharmacy that his sub-

sequent work even astonished his old master. Young Tanret was of an analytical turn of mind and after mastering the simple substances of the French Codex, threw himself into a study of the most complex compounds contained therein. He read diligently and soon found out all that there was to know concerning the preparations and chemicals which were dispensed in this pharmacy.

At the age of twenty-one, he was looking around for a large field and applied for an interneship at the hospital of Paris which appointment he received. Tanret's love of country was coeval with his ardor in pursuit of knowledge and when the war of 1870 was declared, he gave up his position at the hospital to fight the invader. He served in the infantry throughout the war and took part in the siege of Paris. At the conclusion of the war, he applied again for the position of interneship at the hospital of Paris and, passing the examination, received the appointment the second time. By holding his hospital position he attended the course of instruction at the Collège de France and was particularly impressed with the teachings of Berthelot, for whom he acquired the most profound admiration and who offered him an assistantship. The latter position he could not accept on account of his meager finances and it seems a great pity that one with the initiative and brilliancy of Tanret could not have been permitted to pursue his scientific studies and continue at one of the great schools in Paris. He had won a silver medal at the Ecole de Paris and thought it was not required, presented a thesis entitled "D'Albumine." The work in connection with this dissertation was unusually thorough and contrary to what is usually the case, this thesis was one of his most important scientific contributions and the reactions described bear his name even at the present time.

He had worked himself up to the position of senior interne at the hospital and as the work was becoming more or less routine to him he opened a pharmacy shop at Troyes at the lower end of the la Rue Thiers. I imagine that he was rather happy in this little store, that his clientele was rather small during his first few years, so that it gave him considerable time to pour over the books in the library of his little village. During this time he carefully read all of the volumes of the *Annales de Chimie et de Physique* and the *Comptes rendus de L'Academie des Sceinces.* The more he thought about pharmacy, the more he felt the lure of the study of the active principles of important drugs. His first work which entitles him to

enduring fame was the isolation of the active principles of ergot. Notwithstanding the fact that the experiment required a good deal of money, he with self-denial investigated the nature of the principle and finally succeeded in obtaining a crystalline alkaloid, ergotinine. Upon the completion of this work on ergot, he undertook a study of the alkaloids of pomegranate bark. His success in this study was so great that it attracted wide attention. He isolated four alkaloids, which he named after the French chemist, Pelletier. Furthermore, it was found that the anthelmintic properties of pomegranate were due to these alkaloids and the Academy of Sciences awarded him the Barbier prize.

Tanret was much encouraged by the success of his work and feeling that if he were in a larger city, where the libraries were more comprehensive and the opportunities for scientific research greater, he might accomplish more, he therefore gave up his store at Troyes and moved to Paris. He rented a room on la Rue Denfert-Rochereau street, spending his mornings in investigations and the rest of the day in the laboratory of Berthelot at the Collège de France. These were among his happiest days. His associates were among the master minds of France. He was perfecting himself in analytical methods and acquiring a technique which made him one of the most exacting of investigators. It was while living under these simple conditions that he finished his work on the study of ergot and granatum. It was here also, in collaboration with Villier that he published a paper on the inosite of the leaves of the walnut.

In 1880 he acquired a little drug store at the corner of the Rue de Seze and the Boulevard de la Madeleine. Here his success as an apothecary was almost immediate and one might almost think that as he had tasted enough of the dregs of poverty, he might give up his researches. Not so Tanret. He fitted up a little room in the cellar in which he could steal away from his clientele and continue his scientific investigations. Indeed Tanret's personality was such that his customers looked up to him as a distinguished savant and hesitated to intrude upon him unnecessarily. While occupying this store he published important papers on the active principles in convallaria and vinca, double salts of caffeine, extract of cinchona, terpinol, alkaloids produced by the action of ammonia on glucose, etc. Tanret published 36 papers from the time of graduation from the Collège de France to 1886 and these were assembled in a special pamphlet which he published and distributed among his friends.

In 1886 he gave up his apothecary shop and started a laboratory and an office on la Rue d'Alger. He devoted himself to analytical work and manufacturing on a small scale. He prepared many of the active principles of a high grade of purity. At the Universal Exposition of 1899 he was classed first by the international jury of judges from whom he received the Cross of the Legion of Honor, the only honorary distinction which he was willing to accept during his modest though productive career. In awarding the prize the jury, in the conclusion of their report, said, "By his researches Monsieur Tanret has placed himself in the front rank of analysts. He has succeeded in creating new methods and in bringing into all that he has published an experimental school of the first order."

In 1900 a very great loss befell Tanret in the death of his wife, who had been a companion and an inspiration to him ever since their marriage in 1873. For the time it seemed as though the shock would unnerve him and cause him to drop all of his scientific work. In a little while, however, he recovered himself and through the sympathy of his children took up his studies with renewed energy. During the succeeding years he published some of his most brilliant investigations. They included his work on sugars, the fungi, the glucosides of the bitter orange, the carbohydrates of cereals, the active principles of quebracho, etc. A complete list of Tanret's published papers as well as an excellent biographical sketch will be found in the November number of the *Bulletin de la Société Chimique de France.* There is also a biographical note in the *Bulletin des Sciences Pharmacologiques,* for January–February, 1918.

As has been said earlier Tanret was a patriot of the first order and when the Great World War broke out, although he was an old man, his love for country and self-sacrificing spirit caused him to devote his entire energies for the preservation of the Republic. Immediately he placed the resources of his laboratory in the hands of the medical department, turning over to them his supplies of chloroform, tincture of iodine and other preparations. When the first gas attacks were made by the enemy, he contrived a cotton "antichlore" which he made by the thousands with the aid of his daughter for the troops. His health began to fail in April, 1916, and he was urged to retire to his villa at Sevres, hoping that the change might be of benefit to him. Among the surroundings he loved, his health improved slightly. His mind remained vigorous to the last. Those of his friends who were fortunate enough to visit him were im-

pressed with his breadth of view, his extensive knowledge of French literature, with which he was as familiar as with the master works of the scientists of the world. Early in 1917 the malady with which he was afflicted progressed rapidly, but Tanret's indomitable spirit was almost unconquerable. He continued to work to the very end. The night before his death, he went to his laboratory for the last time. A few hours later he passed quietly away. In accordance with his wishes, the burial service was exceedingly simple and a small company of his intimate friends came to express their sympathies and to do honor to this man of sterling worth whom they had loved. M. Andre, in his biographical memoir, concludes with the following tribute to his memory: "Although inevitable troubles clouded certain portions of his life, one instinctively feels that, on the whole, Tanret was a happy man. He never exhibited the slightest trace of jealousy or envy. He rejoiced in the successes that came to his friends as though they had been his own. He possessed to the depths of his heart a love for his family, devotion to science and loyalty to his friends. Those who came in contact with Tanret will always cherish the memory of that fine face and feel a deep appreciation for the work with which he has embellished French science."

A NEW METHOD FOR A SEPARATE EXTRACTION OF HYDRASTINE AND BERBERINE FROM GOLDEN SEAL ON A LARGE SCALE, AND A REVIEW STUDY OF THE TWO ALKALOIDS.

By Elsa Schmidt.

1. Hydrastine.—$C_{19}H_{15}(O\cdot CH_3)_2O_2N$. Golden seal (ground for percolation) is moistened with benzol containing a little ammonia and then packed into a percolator and saturated with benzol. The drug is left to macerate for 24 hours, then percolation is started and the drug exhausted with benzol.

The benzol extracts are now shaken out with dilute sulphuric acid (3 per cent.) the acid washings collected and from it the alkaloid is precipitated with ammonia. It may be purified by redissolving and precipitating, or by recrystallization from ethyl alcohol.

Properties.—Hydrastine occurs in white or creamy white glistening prisms, or as a white, micro-crystalline powder, and is perma-

nent in air. One gram is soluble in 170 Cc. of alcohol, 1.4 Cc. of chloroform, 175 Cc. of ether, freely in benzol, and almost insoluble in water. The salts of it are yellow. Hydrastine can be prepared synthetically. It is precipitated amorphous from its aqueous solution upon the addition of alkali hydroxides or carbonates, but the precipitate assumes gradually the crystalline form.

Tests.—An eqeous 5 per cent. solution made with the aid of dilute hydrochloric acid should not be reddened by chlorine water (absence of and difference from berberine). A 1 per cent. solution in dilute sulphuric acid develops a blue fluorescence if potassium permanganate solution is added; but no fluorescence should be visible before the addition of the reagent. (Distinction from hydrastinine) U. S. P. That is, with oxidizing agents in acid solutions hydrastine yields *hydrastinine* and *opianic acid,* while in alkaline solutions, hemipinic and narcotinic acids are produced.

Froehde's reagent gives with hydrastine a characteristic test. A sage green color appears slowly changing to brownish and then gradually fading.

Estimation.—The gravimetric estimation of the U. S. P. is known. Puckner states that the following methods are preferable to those described in the U. S. P. Five grams of the powdered rhizome of hydrastis canadensis are treated with 50 Cc. of ether and after standing 10 minutes, 2 Cc. of ammonia are added and the mixture allowed to stand for 30 minutes with frequent agitation. The mixture is then filtered and the residue extracted with a second 50 Cc. of ether. The combined ethereal solution in first shaken with 2 Cc. of dilute hydrochloric acid and 18 Cc. of water, then with 10 Cc. of water containing 5 drops of dilute hydrochloric acid and finally with 10 Cc. of water. The combined aqueous solution is made alkaline with ammonia and extracted three times with 20 Cc. of ether. The ethereal extract is evaporated at ordinary temperature, the residue dried at 98°–100° and weighed.

Note.—The author gets the best result by letting 10 Gm. of the powdered drug macerate over night in 100 Cc. of ether and 3 Cc. of ammonia, then taking an aliquot part and continuing as above by using water and acid.

In the case of the fluid extract, 5 Cc. are well shaken with an equal volume of a 20 per cent. solution of potassium iodide and 20 Cc. of water, filtered and the precipitate washed twice by stirring with 5 Cc. of a 1 per cent. solution of potassium iodide, the liquid

being passed through a filter, and then twice with the same solution on the filter. The filtrate and washings are extracted three times with 20 Cc. of ether, the ethereal solution filtered through cotton-wool, evaporated, the residue dried at 95°–98° and weighed.

2. BERBERINE.—The ground golden seal from which the hydrastine has been removed is dried or drained free from the benzol. It is then saturated with water (hot) acidulated with acetic acid and macerated for a few hours. Percolation is started and the percolate received in a vessel containing a small amount of concentrated hydrochloric acid. Berberine hydrochloride will form immediately and can be filtered out. The berberine hydrochloride thus obtained is rather pure. The first percolate might contain traces of hydrastine. Traces of free chlorine can be removed by washing the precipitate on the filter with a small quantity of water containing only a very small amount of hydrochloric acid.

Properties.—Berberine, or its salts, have a persistent bitter taste, and are employed medicinally in doses of 2 to 5 grains. Sixty Grs. have been taken by man without injury but the alkaloid is poisonous to dogs, etc. It dissolves in 4.5 parts of water giving a yellow solution neutral to litmus. It is easily soluble in hot water and alcohol and dissolves in 100 parts of dilute alcohol (Proctor), is slightly soluble in chloroform and benzene, insoluble in ether (separation from hydrastine) and petroleum spirit. According to E. Schmidt[1] berberine has a remarkable tendency to combine with neutral solvents, such as, alcohol, ether, acetone and chloroform to form crystalline compounds. When berberine and chloroform are mixed in molecular proportions they unite to form a beautiful crystalline substance, permanent at 100°. This does not appear to be a mere additive product since it is not decomposed by acids simply into berberine and chloroform, but yields decomposition products of the latter. Berberine can also combine with a second molecule of chloroform but this behaves like water of crystallization. Schmidt has also described a compound of berberine with acetone of the formula $C_{20}H_{17}O_4N$, C_3H_6O.

Uses.—Berberine, or its salts, is an excellent tonic and has slightly laxative properties. If administered with hydrastine it will eliminate indigestion caused by the white alkaloid, and being a tonic, will add to the value of hydrastine. It will be found to exert an efficient action upon all abnormal mucous tissues and can be used

[1] *Pharm. Zeit.*, 1887, 32, 542.

where barberry or golden seal is indicated. Its dose is from 2 to 20 grains in powder, or dissolved in water to which a little acetic acid may be added to aid its solution.

Tests.—When treated with sodium hydroxide solution, berberine is colored brown, and upon boiling this brown solution a resinous mass separates. On distilling berberine with milk of lime, quinoline is formed. Fusion with potassium hydroxide produces berberic acid $C_8H_8O_4$; and an acid of the composition $C_8H_8O_5$.

If treated with nacent hydrogen, berberine is reduced to hydroberberine, $C_{20}H_{21}O_4N$. Berberine dissolves in concentrated sulphuric acid wtih an orange yellow color changing to olive-green on warming. On addition of chlorinated water to a solution of berberine strongly acidified with hydrochloric or sulphuric acid, a zone of bright red color is formed at the zone of junction of the liquids and is still recognizable as a pink coloration in a dilution of 250,000 (Allen). The reaction is destroyed by reducing agents. (Brucine gives a similar indication with chlorine water but the original solution is colorless and the color less permanent than with berberine.) Mayer's reagent gives a precipitate $B_2H_2HgI_4$.

Detection in Plants (Allen).—Five to 20 Gm. are extracted with alcohol, evaporated, treated with 20 to 40 Cc. of water and filtered through talc. A small portion of the clear filtrate is mixed with a small quantity of a 10 per cent. solution of potassium iodide. If no precipitate is formed no appreciable amount of berberine is present, but if a precipitate is deposited 10 Cc. of the original filtrate are mixed with 1 to 2 Cc. of a 10 per cent. solution of sodium hydroxide, filtered if necessary, heated to 50, treated with 5 Cc. of acetone and allowed to stand. If after two hours no crystals have formed, 30 Cc. of water are added and the solution kept in a cool place over night. In this time crystals will form if 10 Cc. of original solution contained not less than 0.01 Gm. berberine.

The crystals may be identified by dissolving in dilute hydrochloric acid and testing portions of the solution with potassium iodide, potassium dicromate, picric acid, or chlorine water. When no crystals form, although potassium iodide has given a precipitate with the equeous solution of the extract, 10 or 20 Cc. of the extract are mixed with an excess of a 20 per cent. solution of potassium iodide. The precipitate formed is collected on a filter and washed first with dilute potassium iodide solution and then with water The filtrate and washings are concentrated to about 2 Cc., treated with a

few drops of sodium hydroxide solution and 1 Cc. of acetone and after standing some hours diluted with an equal bulk of water, good crystals of berberine-acetone will be deposited within 24 hours if 0.0010 Gm. of the alkaloid is present.

A microchemical method of detecting berberine has been described by Bauer.[2] A section of the plant tissue is floated in a few drops of water on a microscope slide, allowed to macerate for a few seconds, warmed with one or two drops of sodium hydroxide solution (10 per cent.) and treated with four or five drops of acetone and covered with a micro-cover glass. The growths of characteristic crystals of berberine-acetone is observed under the microscope in some cases in 5 minutes, while in others several hours are required.

Estimation.—Gravimetric method of Gordin. The berberine in an aqueous-alcoholic solution is precipitated with excess of a 10 per cent. solution of potassium iodide, the precipitated iodide washed with a two per cent. solution of KI and transfered with a little water into a flask. After heating to 60°–70° acetone is added to the extent of one-third the volume of the water and the mixture shaken for 10 minutes. Five Cc. of a 10 per cent. solution of sodium hydroxide are then added and the liquid shaken (heating to 50°–60° if necessary) until the yellow hydro-iodide has disappeared. After cooling, the solution is diluted with water to three times its bulk and allowed to stand over night. The berberine-acetone is filtered off, dried first under reduced pressure and then at 105° and weighed. One Gm. of the acetone compound corresponds with 0.853 Gm. of berberine. To correct for the berberine acetone dissolved in the mother liquer 0.0000273 is added per Cc.

Berberine Hydrochloride.—By the above mentioned method of manufacturing berberine, the hydrochloride of the alkaloid is obtained. This salt is the easiest obtainable and is very stable. It is not as soluble as the sulphate but as effective, and is readily soluble in boiling water. It is almost insoluble in alcohol or dilute hydrochloric acid and is with difficulty decomposed by bases. Silver-oxide readily decomposes it in solution. *By prolonged exposure at 100°* the color changes permanently to an orange color and the salt *becomes readily soluble in water* with a red color. This does not contain much if any free chlorine.

Tests.—The mixture of the salt with KI changes to a graphite color when treated with a drop of hydrochloric acid and then to a

[2] *Pharm. Zeit.*, 1908, 53, 618.

yellow on adding KOH solution. The salt becomes dark green when mixed with picric acid and treated with sulphuric acid. Its plain solutions are yellow. For properties see under Berberine.

LABORATORIES OF
ALLAIRE, WOODWARD & CO.,
PEORIA, ILL.

NOTES ON EMETINE HYDROCHLORIDE.

BY GEORGE É. EWE.

THE PROPORTION OF CEPHÆLINE IN THE EMETINE HYDROCHLORIDE ON THE MARKET.

The manufacture of emetine hydrochloride from ipecac presents the problem of separating emetine alkaloid from the drug, in a condition of comparative freedom from cephæline alkaloid, which also occurs naturally in the drug. Recognizing this problem, the U. S. P. requires the following test to be applied to emetine hydrochloride in order to insure the absence of any considerable proportions of cephæline:

"Dissolve 0.1 Gm. of emetine hydrochloride in 5 mils of distilled water in a separatory funnel, add to the solution 3 mils of sodium hydroxide T. S. and shake it out with 10 mil portions of ether until the residue obtained by evaporating 1 mil of the ethereal liquid when dissolved in 1 drop of diluted hydrochloric acid and 1 mil of distilled water, no longer yields a turbidity with iodine T. S. Now acidulate the aqueous liquid with diluted sulphuric acid, then add ammonia water until alkaline and shake it with 10 mils of ether. Evaporate this ethereal liquid and add to the residue 1 mil of sulphuric acid containing about 0.005 Gm. molybdic acid; no purple color is produced. (Cephæline.)".

When applied to samples of emetine hydrochloride representing the products of five American manufacturers, a pale reddish-purple color, followed rapidly by a brown, and finally a light green was obtained in each case.

The U. S. P. states that "no purple color is produced" and since all of the samples examined gave purple colors, more or less modified and of decided intensity, the amount of cephæline in the samples was

determined quantitatively, in order to ascertain if the proportion present was material in quantity.

The method employed was based on the U. S. P. qualitative test for cephæline modified by starting with 0.6 Gms. of the emetine hydrochloride, increasing all reagents six times when necessary, weighing the cephæline instead of treating it with sulphuric-molybic acid and running a blank correction throughout the method. The larger quantity of emetine hydrochloride was employed in order to obtain an accurately weighable quantity of cephæline.

The quantitative method can be described as follows:

Dissolve 0.6 Gm. in 30 mils of distilled water in a separatory funnel, add to the solution 18 mils of sodium hydroxide T. S. and shake it out with 60-mil portions of ether until the residue obtained by evaporating 1 mil of the ethereal liquid, when dissolved in 1 drop of diluted hydrochloric acid and 1 mil of distilled water, no longer yields a turbidity with iodine T. S. Now acidulate the aqueous liquid with diluted sulphuric acid, then add ammonia water until alkaline and shake it out with 60 mils of ether. Separate and evapoate this ethereal liquid in a tared flask. Dry the residue of cephæline in the flask at 60° C. to constant weight and weigh it as anhydrous cephæline alkaloid. Run a blank correction throughout the method and correct final weight of anhydrous cephæline alkaloid accordingly, if necessary.

Five extractions with ether are usually required before the iodine T. S. fails to yield a turbidity with the extraction, and even after a sixth extraction, a slight turbidity is sometimes obtained. The use of five extractions was adopted in these experiments. A blank correction indicated a necessary deduction of from ½ to 1 milligram from the weight of anhydrous cephæline alkaloid obtained in the several tests.

The quantitative test was applied to samples of emetine hydrochloride representing the products of five American manufacturers with the following results:

ANHYDROUS CEPHÆLINE ALKALOID.

Manufacturer.	Per Cent.
1	1.65
2	3.10
3	2.1
4	0.80
5	2.10

These results indicate:

1. That the U. S. P. test for cephæline, if literally interpreted, would exclude the majority of the emetine hydrochloride on the market.

2. That a material proportion of cephæline is not present in the emetine hydrochloride on the market.

3. A quantitative test along the lines suggested in this paper should be resorted to in the event of an apparently excessive proportion of cephæline being indicated by the U. S. P. limit test.

4. The adoption of an upper limit of 3 per cent. of cephæline in connection with a quantitative test would insure the absence of excessive proportion of cephæline in the emetine hydrochloride on the market.

The Effect of Heat of Emetine Hydrochloride.

If the alkaloids of ipecac obtained during the assay process are allowed to remain on the steam bath after the ethereal solvent has evaporated, darkening and disintegration of the alkloids results. Of three experiments in which the alkaloids were kept at water-bath temperature for five minutes after the ethereal solvent had evaporated, 6.7 per cent., 6.0 per cent. and 3.0 per cent., respectively, of the total amount of alkaloids present was lost.[1]

Since the alkaloids of ipecac are somewhat sensitive to heat, and as emetine is one of the alkaloids of ipecac, attention was given to the influence of the heat used in sterilizing ampule solutions of emetine hydrochloride.

Experiments were made by selecting three different lots of U. S. P. emetine hydrochloric, assaying them volumetrically, weighing out the theoretical quantities based on the assays, to prepare definite volumes of solutions containing 0.5 Gm. anhydrous emetine hydrochloride per 100 mils; 0.5 grain anhydrous emetine hydrochloride per mil, and 0.666 grain anhydrous emetine hydrochloride per mil, respectively. These three solutions were placed in ampules, sealed and heated at about 115° C. until sterile. A very slight darkening of the solution occurred in each case. The three solutions were then assayed volumetrically with the following results, respectively:

0.512 Gm. anhydrous emetine hydrochloride,
0.485 grain " " "
0.687 " " " "

[1] Ewe, G. E., and Vanderkleed, Chas. E., Proceedings Penna. Pharm. Assoc., 1914, p. 275.

Therefore, it was concluded that ampule solutions of emetine hydrochloride do not materially alter in strength upon sterilization even if the heat employed is sufficient to cause a slight darkening of the solution.

Crystallized emetine hydrochloride was also tested for its resistance to the influence of the degree of heat ordinarily employed in sterilization.

A specimen of U. S. P. emetine hydrochloride was divided into three portions; these three portions were heated to 120° C., 100° C. and 80° C., respectively, until they ceased to lose weight, and were then assayed volumetrically with the following results:

Temperature of Heating.	Per Cent. of Anhydrous Emetine Hydrochlorids.
120° C.	95.83
100° C.	99.60
80° C.	100.02

Therefore, it was concluded that crystallized emetine hydrochloride practically withstands ordinary sterilization temperatures.

The Effect of Light on Emetine Hydrochloride.

The U. S. P. directs that emetine hydrochloride be protected from light.

Solutions of emetine hydrochloride also require to be protected from light. Experiments showed that diffused sunlight for a matter of weeks is required to just appreciably darken solutions of emetine hydrochloride and direct sunlight for at least three hours' duration is required to just appreciably darken solutions.

The Acidity of Emetine Hydrochloride.

The hypodermic use of solutions of emetine hydrochloride is frequently attended with irritation at the site of injection. One of the possible factors contributing to the irritation is acidity of the emetine hydrochloride. Some processes for the manufacture of emetine hydrochloride finally yield the salt in a condition in which free hydrochloric acid is present. If this free hydrochloric acid is not carefully eliminated it will contribute to the irritation attendant upon injection.

The U. S. P. recognizes this possibility and requires that emetine hydrochloride in aqueous solution (1 in 20) be only slightly acid to

litmus. Emetine hydrochloride will readily retain 1 per cent. or more of free hydrochloric acid and not show its presence by appearance or odor. This excessively acid product will, of course, be only "slightly acid to litmus." Actual titration of a solution of emetine hydrochloride with a standard alkali solution in the presence of methyl red as indicator and a limiting of the free acid to a few tenths of a per cent., calculated as absolute HCl, are to be preferred over the present U. S. P. method of simply testing a solution with litmus.

In connection with the subject of local irritation attendant upon injection of emetine hydrochloride solution, it may be of interest to mention that experiments on human subjects indicated that less local irritation was experienced when the solutions were prepared with distilled water than when prepared with normal saline solution. This was ascribed to the fact that the solutions made with distilled water were more closely isotonic with the blood.

THE EFFECT OF TIN ON SOLUTIONS OF EMETINE HYDROCHLORIDE.

A specimen of emetine hydrochloride, answering all of the U. S. P. requirements and having an acidity to methyl red equivalent to less than 0.1 per cent. absolute HCl was dissolved in distilled water to make a 2 per cent. solution. Tin foil, assaying 99.83 per cent. metallic tin, and containing traces of lead, iron and aluminum was allowed to stand in contact with the solution of emetine hydrochloride at room temperature for two weeks. At the end of this time the solution contained a considerable quantity of a whitish flocculent precipitate, the tin being apparently unaffected. This whitish flocculent precipitate when centrifuged out and washed with water was practically entirely soluble in ether. The ether solution yielded a substance upon evaporation which gave reactions for the alkaloid. A control experiment without tin remained perfectly clear.

Another specimen of emetine hydrochloride, answering all of the U. S. P. requirements and having an acidity to methyl red equivalent to less than 0.1 per cent. absolute HCl was dissolved in distilled water to make a 2 per cent. solution. Some of the tin foil used in the previous experiment was placed in the solution and the solution was then heated on a water bath under a reflux condenser for one day. A small quantity of precipitate like that yielded by the previous experiment was obtained. The conclusion is that

metallic tin acts similarly to a soluble alkali in liberating alkaloid from solutions of emetine hydrochloride, the time required, however, being prolonged.

ANALYTICAL LABORATORY OF THE
H. K. MULFORD COMPANY.

SAPO MOLLIS U. S. P. IX.

BY BERTHA MUELLER,

ASST. PHARMACIST AT THE LANKENAU HOSPITAL, PHILADELPHIA.

Opportunity has recently been afforded us to try out the U. S. P. formula for sapo mollis, and we have found that the formula is satisfactory, though the technic is not. Indeed, it is quite inconceivable just why the technic should be so unnecessarily cumbersome and unpractical, when it must be conceded that it is an exceedingly simple matter to make soap.

According to the pharmacopœia, one is directed to dissolve the potassium hydroxide in a capacious vessel by means of heat, add the cotton seed oil, stir actively for a few moments, reapply the heat until the mixture froths due to boiling, add the alcohol, stir some more, and then stop in the midst of it to assay the preparation! It is only natural that the question should arise: Why all this extra work? Certainly just as good a soap can be prepared by a far more simple method.

It is common knowledge that artificial heat is not actually necessary in the manufacture of soap, and certainly not where alcohol enters into the combination. It is likewise a well-known fact that alcohol is rapidly vaporized in the presence of a high degree of temperature, therefore the small amount of alcohol in the given formula must perforce be largely driven off when added, as directed, to a boiling hot mixture in a capacious vessel: consequently the object of putting alcohol into soap in order to increase its detergent power is defeated.

It has been our experience, if the caustic potash solution is sufficiently concentrated and a suitable vessel be used, that soft soap can most easily be made without the aid of heat and with very little expenditure of time and labor.

The potash should be dissolved in an equal weight of water and

in a container that will retain the heat developed during the process of solution. It is well that the container should not be any larger than is necessary to hold the finished product, and if possible, it should be a deep vessel in preference to a shallow one. When solution has taken place, the oil should be added, followed by the alcohol. The mixture should then be stirred with occasional intermittance until saponification has taken place, which takes from 15–20 minutes, and can be readily recognized by the mixture assuming the nature of a thick smooth paste, the color of which gradually becomes clearer on stirring. At this stage the rest of the water may be added with possibly an occasional stirring until it is all absorbed and a clear soap results.

That one should have to stop in the midst of the process in order to carry out an assay, is most troublesome and equally unnecessary, for the pharmacopœia directs that the percentage strength of the potash should be known before hand and the amount of oil required should be calculated accordingly. Now, if one is tolerably careful in weighing out these materials, how can there be any doubt of the proper outcome with regard to alkalinity?

It may perhaps be pertinent to suggest that framers of formulas give more consideration to simplicity in technic in order that pharmacists may be encouraged to do more of their own manufacturing, by which means a more intimate knowledge of our official text books would be gained and with it the interest in them stimulated. Incidentally pharmacists would get a great deal of satisfaction and pleasure out of doing just such work, for there is truly much in pharmacy that is highly interesting.

IODOGLYCEROLE.

By E. S. Talbot, M.D.

CHICAGO, ILL.

This preparation was first used in the treatment of so-called pyorrhea alveolaris in 1878 and for the general cleaning of the gums and mucous membranes before operating and has been continuously in use in my practice since that date.

It was found that when the official tincture of iodine was used that it removed the mucous membrane of the mouth. It was also

soon evident that different strengths of iodine were required with different patients. Likewise, that a more astringent preparation was necessary. After much experimenting the following formula was produced and is commonly known as

TALBOT'S IODOGLYCEROLE.

Zinc iodide	15 parts.
Iodine	25 parts.
Distilled water	10 parts.
Glycerin	50 parts.

This preparation can be diluted with water to suit any mucous surface. The formula has been extensively used in dental practice throughout the world.

THE FEDERAL BOARD FOR VOCATIONAL EDUCATION WANTS EVERY DISABLED SOLDIER AND SAILOR TO KNOW—

That the government is resolved to do its best to restore him to health, strength, and self-supporting activity.

That until his discharge from hospital care the medical and surgical treatment necessary to restore him to health and strength is under the jurisdiction of the military or naval authorities.

That the vocational training which may be afterwards necessary to restore his self-supporting activity is under the jurisdiction of the Federal Board for Vocational Education.

That if he needs an artificial limb or other orthopedic or mechanical appliance the Bureau of War-Risk Insurance supplies it free upon his discharge and renews it when considered necessary.

That if, after his discharge, he again needs medical treatment on account of his disability the Bureau of War-Risk Insurance supplies it free.

That any man whose disability entitles him to compensation under the War-Risk Insurance Act may be provided by the Federal Board with a course of vocational training for a new occupation.

That the government strongly recommends each man who needs it to undertake vocational training and put himself under the care of the Federal Board, but the decision to do so is optional with each man.

That if his disability does prevent him from returning to employment without training and he elects to follow a course of vocational training provided by the Federal Board, the course will be furnished free of cost, and he will also be paid as long as the training lasts a monthly compensation equal to the sum to which he is entitled under the War-Risk Insurance Act or a sum equal to the pay of his last month of active service, whichever is the greater, but in no case will a single man or a man required by his course of instruction to live apart from his dependents receive less than $65 per month, exclusive of the sum paid dependents; nor will a man living with his dependent receive less than $75 per month, inclusive of sum paid to dependents.

That if his disability does not prevent him from returning to employment without training and he elects to follow a course of vocational training provided by the Federal Board, the course will be furnished free of cost to him, and the compensation provided by the War-Risk Insurance Act will be paid to him, but no allowance will be paid to his family.

That in addition to the above the family or dependents of each disabled man will receive from the government during his period of training the same monthly allotment and allowance as that paid prior to his discharge from the Army or the Navy.

That upon completion of his course of training he will continue to receive the compensation prescribed by the War-Risk Insurance Act so long as his disability continues.

That in nearly every case, by following the advice and suggestions of the Federal Board, he can either get rid of the handicap caused by his disability or acquire new powers to replace any that may have been lost.

That if he is willing to learn and to take advantage of the opportunities to increase his skill offered him by the Federal Board he can usually get a better position than he had before entering the service.

That if he fails to take advantage of these opportunities he will find himself badly handicapped when he is obliged to compete with the able-bodied men who come back to work after the war.

That the Federal Board, through its vocational experts, will study his particular disability and advise him as to the proper course to pursue and give him free training for the occupation best suited to him.

That on the satisfactory completion of his training the Federal Board, through its employment service, will assist him to secure a position.

That public authorities and other large employers will in many cases, at least, give the disabled soldiers and sailors preference when filling vacant positions, provided they possess the training necessary to fill them.

All disabled soldiers, whether in or out of the hospital, should address their communications either to the Federal Board for Vocational Education, Washington, D. C., or to the district office of the Federal Board of the district in which he is located. The district offices of the board are located at the following points respectively:

District No. 1: Maine, New Hampshire, Vermont, Massachusetts, and Rhode Island. Office: Room 433, Tremont Building, Boston, Mass.

District No. 2: Connecticut, New York, and New Jersey. Office: Room 711, 280 Broadway, New York.

District No. 3: Pennsylvania and Delaware. Office: 1000 Penn Square Building, Philadelphia, Pa.

District No. 4: District of Columbia, Maryland, Virginia, and West Virginia. Office: 606 F Street N.W., Washington, D. C.

District No. 5: North Carolina, South Carolina, Georgia, Florida, and Tennessee. Office: Room 1404 Candler Building, Atlanta, Ga.

District No. 6: Alabama, Mississippi, and Louisiana. Office: 822 Maison Blanche Annex, New Orleans, La.

District No. 7: Ohio, Indiana, and Kentucky. Office: 906 Mercantile Library Building, Cincinnati, Ohio.

District No. 8: Michigan, Illinois, and Wisconsin. Office: 1600 the Westminster, 110 South Dearborn Street, Chicago, Ill.

District No. 9: Iowa, Nebraska, Kansas, and Missouri. Office: 517 Chemical Building, St. Louis, Mo.

District No. 10: Minnesato, North Dakota, and South Dakota. Office: Room 742 Metropolitan Bank Building. Minneapolis, Minn.

District No. 11: Wyoming, Colorado, New Mexico, and Utah. Office: 909 Seventeenth Street, Denver, Colo.

District No. 12: California, Nevada, and Arizona. Office: 997 Monadnock Building, San Francisco, Calif.

District No. 13: Montana, Idaho, Oregon, and Washington. Office: Room 539 Central Building, Seattle, Wash.

District No. 14: Arkansas, Oklahoma, and Texas. Office: 810 Western Indemnity Building, 1000 Main Street, Dallas Texas.

Editorial Comment.—It appears to us that pharmacy opens up to many of these returning disabled soldiers and sailors an exceedingly inviting field for future professional careers and unusual possibilities for them to make, likewise, notable commercial successes. The schools of pharmacy are anxious to coöperate with the Federal Board for Vocational Education and the Philadelphia College of Pharmacy some time since placed before the officials of District No. 3, the facilities of the college and the desire of its officers and faculty to aid in every way possible in the education of such returning men of the service who desired to secure an education in pharmacy or chemistry.

WAR CHEMISTRY AND MEDICINE.[1]

The signing of the armistice and the prospect of a long, if not permanent, peace have lifted the veil of secrecy that has long hidden many undertakings of great scientific interest in connection with the war. Only a few months ago every one was saving fruit kernels and nut shells at the behest of the American Red Cross. It was vaguely known that the materials were to be converted into charcoal, which was to be employed in the manufacture of gas masks. But why these particular products were selected, what became of them, and how they act were questions that belonged to the great mass of mysteries developed by the secrecy of war time.

Colonel Burrell,[2] chief of the research division of the chemical warfare service, has at length disclosed some of the "inside history" of his service. The absorbent value of charcoal of a suitable sort is extraordinary. During its preparation, a film of hydrocarbons is likely to remain adherent to the surface of the particles. To remove this is highly important, because it seriously diminishes the absorptive power. American initiative, guided by chemical science, found a way to overcome the difficulty. By oxidizing processes the charcoal was cleansed of its hydrocarbon film and rendered active.

The extraordinary and utterly unexpected diverstiy of gases and

[1] Reprinted from *Jour. Amer. Medical Asso.*, March, 1919.

[2] Burrell, G. A., "The Research Division, Chemical Warfare Service," U. S. A., *J. Indust. and Engin. Chem.*, 11, 93, 1919.

other noxious substances employed by our enemies in their warfare[3] early taxed the ingenuity of all the Allies to devise satisfactory respirators. At first an alkaline solution was sufficient to protect against inhalation of chlorin; but when phosgene, prussic acid, xylyl bromide, chlorpicrin, bromacetone and a succession of other equally formidable products had to be taken into account, cheesecloth impregnated with alkali or even with sodium phenate and hexamthylenamine no longer saved the wearer of the mask from untoward effects. The soda-lime finally developed and used in masks contained lime, cement, infusorial earth, sodium hydroxide, sodium permanganate and water. Each ingredient performed a definite function. The lime furnished the main part of the absorption for acid gases, which it neutralizes, generally with the formation of calcium chloride. The cement is used to make the granules sufficiently hard and yet not decrease the porosity, which is fatal to good absorption. Several other binders give equally good hardness, but all destroy the porosity. The infusorial earth is used to increase the porosity of the granules and thus permit the gas to have access to the interior and utilize the full absorptive capacity of the granule. The sodium hydroxide activates the rate of absorption of most gases, and, in addition, makes the control of the drying process more simple and tends to maintain the proper water content in the finished granule. The sodium permanganate is used primarily to oxidize certain oxidizable gases, which are difficult to absorb in gas masks. The water is necessary in making up a satisfactory mixture, and, after drying, a fairly definite moisture content is needed to get the best results in the absorption of gases.

Nor is the story of prophylactic measures against chemical modes of warfare completed with the description of the gas masks. Since most of the casualties from the widely used mustard gas were due to skin burns, it became necessary to devise suitable protective clothing. Gummed suits might be appropriate in winter, but they became a physiologic impossibility in hot days. Yet even this handicap was finally overcome by the designing of suits that were not impermeable to air and moisture, yet absorbed mustard gas vapor.

Some day an orderly account of the almost infinite variety of chemical problems that the government was called on to answer in this war will be written. It will be a story of fascinating interest.

[3] "War Gases and Chemical Warfare," editorial, *J. A. M. A.*, 71, 1742, (November 23), 1918.

We shall learn how one scientist devoted his energies to the production of metal Dewar flasks for providing liquid oxygen to aviators; how another one spent days in finding the best way to disperse toxic solids or liquids, producing a fine powder or mist to penetrate masks; how many others worked unceasingly to synthesize new types of toxic compounds of arsenic or selenium or tellurium, whereupon colleagues tested their pharmacologic potency; how face masks with nondimming eyepieces were made comfortable for working and sleeping hours; how helium was extracted from natural gas to replace hydrogen in balloons. Now that the war is over we can pause to consider innumerable scientific advantages of the ceaseless labor and investigation of the past months. The thought that went into the war work, says a reviewer of its details, cannot be destroyed. The industries have gained much through the personal sacrifices of American chemists; likewise has medicine. The charcoal, the gas mask, the many potent new compounds, the liquid oxygen, the protective clothing, the dispersoids—these and dozens of other discoveries will surely find an application, somehow, somewhere, some day.

MODERN PAINT VEHICLES.[1]

By James E. Heckel,

CHIEF CHEMIST, JOHN LUCAS & CO., INC.

During the four years just past, the German lust for world dominion, now happily rendered impotent, at least for a century or two, succeeded in disturbing greatly many of the normal customs, channels of supply and sources of information, of the sane portion of the world's population.

Gradually, as the need for tonnage to supply our forces and carry them "over there" increased, the pressure on us at home increased. We were forced by a long and complex chain of circumstances to meet a shortage of all sorts of materials which everyday habit had taught us to regard as essential and in the same class with air and water. Many familiar substances enlisted or were drafted, and right

[1] A paper read before the annual convention of the Pennsylvania Master House Painters' and Decorators' Association. Reprinted from *Drugs, Oils and Paints*, February, 1919.

in the middle of the winter of "nineteen hundred-and-freeze-to-death," as it was called, both coal and food went to war.

To all of us who were connected with the paint and varnish trades, one of the most serious of these shortages was that of linseed oil.

We were so accustomed to having sufficient linseed oil for our requirements, that the shortage in ships and the consequent government embargo on the importation of flaxseed from the Argentine Republic, brought us up quite suddenly with a cold chill at our closeness to a very serious shortage in our linseed oil supply.

The annual production of American flax has been insufficient and decreasing for the last decade and very noticeably so during the last two or three years. We had been getting into the habit of depending more and more on the Argentine and of late years on Canada, to help us make good our demand and the requirements of consumers of paint.

The normal annual consumption of flaxseed in this country is between 25,000,000 and 30,000,000 bushels; while our annual production for some years past has been well under 20,000,000 bushels, so you see we are far from self-supporting. For the first part of 1919 the government has lifted the embargo on Argentine flax and authorized the importation of some 3,000,000 bushels. This, of course, will help some, but the problem will never be solved, at least in peace times, by trying to satisfy the industry with a percentage of its absolute needs. A "drop in the bucket" is still a "drop in the bucket," even if the drop be extra large and the bucket only a thimble.

In normal times there are just three means of overcoming the shortage: increase flax production; import enough seed to make up the shortage; or use other oils to eke out.

The first method of solution has been the aim of the Flax Development Committee and the Educational Bureau of the Paint Manufacturers' Association. The work of this committee, started in 1907, when conditions were very acute during that year because of the failure of the crop, cannot be too highly praised. To quote from the circular of the Bureau: "No more effective work has ever been accomplished (not even by the German Government) in behalf of any industry than this work for the paint industry of the United States. The committee has wisely contented itself with selecting

the men who understood the subject and supplying them with the necessary funds for educational work among the flax growers."

Incidentally, it is just such intelligent coöperation as this that has placed the United States far ahead of all other nations in the scientific and modern development of its painting and decorating industries. The presence of some of us here today is another evidence of that close and friendly coöperation, which like intelligent competition, is the "life of trade."

Before the Flax Development Committee began its work, the belief was prevalent among the farmers of the Northwest that soil on which flax had once been grown could not again be used for this purpose. There was some cause for this belief because the disease known as "flax wilt" was very destructive and the crop did impoverish the soil. The committee chairman, however, through the agricultural experiment stations, showed the farmers that flax could be grown on the same soil every fourth year in proper rotation with certain other suitable crops. This was a most valuable work and has and will recover a large acreage for flax.

The greatest difficulty lies in the price of wheat, averaging 31 bushels for each acre, fixed by the government at $2.26; so that the farmers do not see much in flax averaging 10 bushels per acre, at $3.00 or even $4.00 per bushel.

The second means of relief was, as we have seen, practically cut off by the shortage of ships.

The third, the line of least resistance, was taken by the largest purchaser of paints, the United States Government.

It is then with a discussion of the possible substitutes for linseed oil, that the War Service Committee of the Paint Manufacturers' Association and the government experts were most highly concerned.

After many meetings and much discussion, the several departments of the government issued, during the last year or two, a number of specifications permitting the use of relatively large percentages of soya bean oil or refined fish oil at the option of the manufacturer. Certain other well known oils would have been equally acceptable if they could have been obtained in quantity. Among these may be mentioned lumbang ("Kukui" or candlenut oil), perilla and hempseed oils.

If the "life of a paint is good oil," so much more is the life of the liquid or vehicle portion of that paint "good oil." The question

resolves itself into "What is good oil?" and finally "What is a paint oil, and when is an oil a paint oil?"

In general, when we speak of a paint "vehicle," we mean all the liquid portion of the paint.

This vehicle can, in all cases, be split into two fairly distinct parts: the "volatile oils or thinners" and the "non-volatile or fixed oils," which form the bulk of the vehicle.

Among the "volatiles" (which can be distilled off from the rest of the paint in a current of steam and examined separately) we include turpentine (both wood turpentine and gum spirits), the various turpentine substitutes and benzine or naphtha.

The only comparatively new materials here are the turpentine substitutes, which possess many valuable properties, and which for the last ten or fifteen years have been distilled from petroleums either of asphaltic or paraffine bases. They are bought and sold under very rigid requirements and specifications as regards flash point, distillation, specific gravity, etc.

By far the largest part of the vehicle consists of the non-volatile or fixed oil portion. This usually consists of pure linseed oil, except in the flat wall paints and the enamels, which in one case may contain China wood oil, and in the other contain varnishes.

The non-volatile or fixed oils fall naturally into two great classes: (1) vegetable and (2) animal oils and fats. These two groups are both further sub-divided by chemists into four sub-groups: (1) solid fats; (2) non-drying oils; (3) semi-drying oils; (4) drying oils.

The solid fats are not of interest to us. The non-drying oils (even when vegetable or animal, and not mineral), are not of interest either to the conscientious manufacturer or master painter. The last class (the drying oils) and sometimes a mixture of one or more of them with a properly balanced percentage of one of the third class of semi-drying oils, is the only group which is really worth our attention. Drying oils suitable for use in paint may be either vegetable (linseed, soya, perilla) or animal (fish or menhaden) oils. Experiments and tests have even been made on whale oil and porpoise jaw oil, to indicate the breadth and scope of the field of investigation, but they were not very satisfactory.

The next questions which naturally come to mind at this point are: "How does a drying oil dry?" and "Why does it dry to an elastic film, while some other oils do not; and some (the heavy mineral oils) never dry?"

The complete answer to these questions is very complex, but the differences in behavior are inherent in the chemical structure of the individual oils. Nature has failed to complete the so-called drying oils, leaving them unbalanced (or as the chemists put it, "unsatisfied"), while the drying oils are complete chemical combinations with their chemical "affinities" satisfied. The drying oils are therefore ready to take on additional atoms to make a complete or satisfied compound. When hydrogen is added, as in the hydrogenation process, we obtain a fixed oil or fat (often edible), and when oxygen is added, as in the ordinary process of "drying," we obtain the familiar pain or varnish film.

The absorption of oxygen by linseed and other drying oils is progressive and continues long after the oil would be called "hard dry" by the painter, although very slowly. The dried film of linseed oil is known as linoxyn and contains about 16 per cent. by weight of oxygen which has been added in the drying process, plus, of course, the oxygen originally in the oil's composition. This increase in weight occurs in all drying oils, when they are exposed to the air (which consists one fifth of oxygen); and in some is greater than others.

The fats, waxes and the non-drying oils cannot absorb oxygen because they are "satisfied" compounds to start with; while the name of the semi-drying oils explains their position as intermediate between the drying and the non-drying oils.

In order to determine the relative values of various drying oils we have to determine the percentage of oxygen which they will absorb, the greater the oxygen absorption, the higher the siccative or drying power of the oil.

Now it is absolutely impracticable to add gaseous oxygen directly to a liquid oil and get it to combine in a way that can be measured. This difficutly has been solved by dissolving the oil in chloroform and adding a known excess quantity of iodine dissolved in acetic acid to the oil. The oil acts upon the iodine and combines with it, just as it does with oxygen, but much more rapidly.

After a definite length of time, the chemist determines how much iodine is free; that is to say, has not combined with the oil; the difference between this and the total quantity of iodine brought in contact with the oil represents the quantity added to or absorbed by the oil.

This so-called "iodine number" or "iodine value," therefore,

serves, within limitations, as a measure of the relative serviceability of oils for use in paints. It is expressed in terms of per cent. by weight of iodine absorbed; an iodine number of 185 therefore signifies that the oil will absorb 185 per cent., or almost twice it own weight of iodine.

Paint and oil chemists become so familiar with the relative iodine values that an oil is instinctively classified, at least to some extent, as slow or quick drying, as soon as its iodine number is given.

These iodine numbers will vary slightly, even for the same oil, depending on when the seed was gathered, where it was grown, etc., at least in the case of linseed and soya bean oils.

The iodine values of the various drying oils, with the highest given first, range in order roughly as follows:

Oil.	Iodine Number.
Perilla	190–212
Linseed	175–200
Menhadden fish	155–175
China wood	150–170
Candlenut or Lumbang	135–165
Poppyseed	135–145
Soya bean	120–140

These represent pretty nearly the extreme variation, although I have seen a sample of lumbang oil, probably impure, which showed the extremely low iodine number of 115.

The half hundred odd samples of linseed oil, representing shipments received in 1918 by John Lucas & Co., ranged from 182.3 minimum to 185 maximum iodine value. Since the specifications of the American Society for Testing Materials require that pure raw linseed oil from North American seed shall show a minimum iodine value of not less than 180, all of the above shipments represented pure raw linseed oil, as far as could be told from a determination of the iodine value.

During the same period, the samples of soya bean all ranged from 132.1–136.9, indicating very good quality oil also, since prime soya oil, of paint making quality, should show an iodine number of about 133. One sample of perilla oil showed an iodine number of 190.4 and a sample of lumbang 162.8. Properly refined menhaden oil shows an iodine value closely approximating linseed oil. These figures are given as indicative only, but they serve to show that all of these oils have, to some extent at least, one of the properties that makes linseed oil valuable.

There are several other chemical, as well as physical characteristics of drying oils, which are very important for their proper valuation. Among these we may mention acid number or value, saponification value, specific gravity and index of refraction.

The acid number is a measure of the free fatty acids present in an oil. It is always small in quantity, but very injurious when excessive, tending, as experiments indicate, to cause livering and hardening of paints in the can.

The maximum acid number permitted for raw linseed oil in prepared paints when pure is six.

Acid numbers of samples of various oils will vary roughly as follows:

Perilla	8–12
Linseed	2– 4
Menhadden	6.8
Soya bean	2– 4
Lumbang	1– 9

One sample of perilla oil which came to my attention showed an acid number of 11.2. The very high acid value of perilla oil, contrary to expectations, does not seem to cause any harm. Perhaps research would show the free acids in perilla oil to be of different composition than those of linseed. However that may be, paints made from perilla oil remain soft in the can, while paints made from linseed oil of equally high acid number would harden and "liver" in less than six months.

The soya bean oil samples analyzed varied from 2.05 to 3.70 in acid number. The impure sample of lumbang oil showed the ridiculous acid number of 52.0. Of course, no one would attempt to use oil of this sort. Whenever a very high acid number is found in an oil, the presence of rosin is at once suspected; and there is a test, the well-known Liebermann-Storch reaction, by which its presence or absence may be fairly well confirmed.

The specific gravity and the other so-called "constants" of oils are very helpful in identifying them when pure, but when mixtures are obtained, the task becomes exceedingly difficult.

Some of the vehicles used in paints made on government specifications are exceedingly complex, and contain various types of China wood oil, rosin and other varnishes. The results obtained in the application of literally thousands of gallons of paints containing all

sorts of ultra-modern vehicles, to all sorts of surfaces, are being observed with much interest by their designers.

We are now prepared to give some sort of answer to the question, "Why linseed oil?" First: because it is accessible, easily obtainable and entirely familiar. Painters know more about it than they know about any other oil. We are most of us mentally lazy and content to let well enough alone. There may be something just as good as even better, but why worry after the ideal when the real adequately serves?

Gentlemen, the war has jammed us out of that state of mind. Progress is not made by people contented to let well enough alone. That mental habit is responsible for the present-day condition in China. The man who is not continually seeking for something better is of no more use to civilization than a dog chasing his own tail. If we cannot lead, we should be willing to follow the leaders or at least give them a respectful hearing.

Today occasional shipments of perilla oil are being offered at a price just a little higher than linseed, usually—and from what is even now known about perilla oil, many men would just as willingly have perilla as linseed oil paint.

A progressive man in this industry cannot for a moment subscribe to the conclusion that it is the business of the manufacturer to give the painter what he wants, with all the complication that goes with that advice. On the contrary, the manufacturer has generally led in the progress of the industry and has forced his discoveries into practice. For example, when colors in oil were first offered in this country by John W. Masury, he found it almost impossible to persuade the painters of his day to use them.

With regard to some of the promising fields for soya oil, we may quote circular No. 50 of the Educational Bureau of the Paint Manufacturers' Association entitled "Soya Oil in Paints," and written by H. A. Gardner, director of the scientific section, whom you all know. He says: "For many years the makers of high-grade prepared paints have used pure linseed oil as a liquid for such paints, adding the usual small amount of drier and thinner required to form a practicable paint suitable for immediate use. Whenever rosin oil, gloss oils, or neutral petroleum base oils have been used as such, partially or wholly, to replace linseed oil in such paints, disastrous results may follow. There is, however, a class of pure vegetable oils produced from seed in the same manner as linseed oil, which have a

thoroughly legitimate use in the paint industry. Of these oils, soya bean oil is the most prominent. From the standpoint of resistance to exposure it compares favorably with linseed oil. One of the most promising uses for soya oil is for the grinding of oil colors. When used for this purpose, soft pastes are produced which do not become hard even upon long standing (probably because of the very low acid value of soya bean oil). Moreover, the amount of soya oil that would be introduced into a white paint base as a result of the use of such colors would be extremely small, since relatively small amounts of color are required for making most tints or shades."

This brings us once more to the question of the newer paint oils. What shall or can the painter do with them? Speaking broadly, I should say—nothing! Proper laboratory facilities and expensive tests, lasting over many months, and sometimes years, are necessary to prevent endless complaint and trouble from the use of the wrong material for the wrong job.

Soya bean oil, properly freed from moisture, by mild heating, may be an exception to this rule. So far as tests have indicated, twenty-five per cent. of such oil added to a good grade of linseed performs in all respects like straight linseed oil.

Of hemp oil we know very little in this country, but European experience and its chemical and physical characteristics warrant the expectation that when made available, it will make an acceptable substitute.

Perilla oil has worked out very nicely for varnish, besides being a first-class paint oil. Typical rosin, China wood oil varnishes containing perilla oil, showed slightly better wearing qualities when exposed to weather than those made with linseed oil.

Lumbang oil is also a varnish oil, but with proper treatment may be useful in paints.

The *Philippine Journal of Science* for September, 1917, contains a most interesting article on the "Comparison of Linseed Oil and Lumbang Oils as Paint Vehicles," by R. H. Aguilar.

He describes tests and gives results of analyses on two varieties of lumbang oil, lumbang bato and lumbang banucalag. The oils are expressed from the seeds of trees, lumbang bato coming from the candlenut tree, which is known in Hawaii as kukui. This tree is very widely distributed through India and Malaya to the Islands of the Pacific.

The other variety of the lumbang comes only from the Philippine Islands.

Aguilar, after a long series of tests, comes to the conclusion that the drying properties of both the lumbang oils are comparable to those of linseed; that the bato oil, in particular, is very similar in paint-making properties to linseed, but like linseed has certain disadvantages for use with red lead.

He finds that the banucalag variety cannot be used as a paint vehicle and dries into a paste with red lead. (The explanation may be partly in its high acid value of 8.70, while the bato variety showed an acid value of only 1.05.)

A very interesting oil for red lead was found in a mixture of banucalag containing between 50 and 75 per cent. bato oil. This gives a paint which does not harden, like paint made from linseed or either of the lumbang oils alone. It is also claimed that the various "painting out" properties of the resulting paint, are better than that of one made from linseed oil alone!

Sunflower seed oil did not turn out as promising for paint use as was first expected.

Properly refined fish or menhaden oil (the "odorless" variety!) appears to have met all physical requirements except that it has a tendency to darken—in other words, it is not apparently satisfactory for use with whites and tints, but it has been used largely in outside green cantonment paint for the U. S. Army, and on rigid specifications as to purity.

Many other oils, such as llalemantia and chia, are under investigation, both from an agricultural and technical point of view, but nothing very definite can be said of them as yet.

With respect to chia oil, a gentleman who had been in Mexico before conditions became so satisfying to lovers of Bolsheviki conditions of living, exported chia nuts to this country for over two years. The oil from these was used by someone who may have been a little more progressive or better equipped than the rest of us, who it was I do not know.

The discussion would not be complete without some mention of the various "dope" oils, near linseed oils and other patent remedies for the ailments of the trade which are so widely advertised.

Some of these are most excellent for the purposes intended, and are sold absolutely on their own merits as substitute oils, not "equal

to linseed." Other sellers are not so conscientious and sell with the intention of defrauding the public.

A practical drying test on glass, and a comparison of the resulting time of drying, nature of film formed, etc., will often give a good idea of the relative value of these oils compared to linseed oil.

Some samples of this type of material would not dry, but remained tacky for over 144 hours. Others gave hard, brittle films containing rosin.

The net result of the foregoing hasty summary is that unless the painter is equipped to investigate or is willing to trust the paint manufacturer who is equipped both to investigate and to produce, he had better make the best of what he knows—pure linseed oil—as long as he can obtain it.

We all remember how in "Through the Looking Glass" a person had to run just as fast as he could to stay right where he was. If you wanted to get ahead, it was necessary to put on a wonderful burst of speed. So it is with this, and all other modern industries; much of our time is occupied keeping up to the times, so let us not be too confident that there is not a wider art or a deeper science than our own. Such confidence may entail a rude awakening.

BENZYL ALCOHOL.[1]

By Lecturer on Pharmacy,

University of Sydney.

Benzyl alcohol is the latest addition to our list of local anæsthetics, and one likely to prove of great value. In these days of cocaine shortage and restriction it will be particularly welcome.

As a chemical compound we have known benzyl alcohol for about a century, and its constitution has been thoroughly established. It belongs to the aromatic series of carbon compounds, and is isomeric with the three cresols having the molecular formula C_7H_8O. It differs from the cresols in constitution, the hydroxyl group occurring in the side chain ($C_6H_5CH_2OH$); it is also known as phenyl carbinol, and may be considered as methyl alcohol, in which one hydrogen atom of the methyl group is replaced by phenyl. Its alcohol char-

[1] Reprinted from *The Chemist and Druggist of Australasia*, January, 1919.

acter is already indicated by this formula. The cresols are phenols, the hydroxyl group being attached to the carbon ring $C_6H_4OHCH_3$.

Benzyl alcohol is a derivative of toluene $C_6H_5CH_3$, one hydroxyl group replacing hydrogen in the methyl group. When oxidized it follows the general reaction for primary alcohols, being converted into an aldehyde (benzaldehyde C_6H_5CHO) and on further oxidation into an acid (benzoic acid C_6H_5COOH).

It occurs naturally free, and combined with anisic and benzoic acid in certain resins, storax, balsam of Tolu and balsam of Peru.

When benzaldehyde is reduced by nascent hydrogen (sodium amalgam) benzyl alcohol is produced.

$$C_6H_5CHO + 2H = C_6H_5CH_2OH.$$

It is also formed when benzyl chloride is boiled with a solution of sodium carbonate; hydrolysis takes place, and the hydrochloric acid set free is neutralized by the carbonate.

$$C_6H_5CH_2Cl + H_2O = C_6H_5CH_2OH + HCl.$$

Preparation.

A very convenient and practical way of preparing pure benzyl alcohol is by means of potassium hydroxide on benzaldehyde.

$$2C_6H_5CHO + KOK = C_6H_5CH_2OH + C_6H_5COOK.$$

It will be seen from the equation that two molecules of benzaldehyde are required to produce one molecule of the alcohol, in other words 212 Gm. of benzaldehyde will theoretically yield 108 Gm. of alcohol, and by the practical method given below 90 per cent. of this theoretical yield may be obtained. If necessary the benzoic acid can be recovered from the potassium benzoate.

Dissolve 90 Gm. of solid potassium hydroxide in 60 mils. of water, cool to air temperature (15° C.) and transfer to a 500–600 mil. stoppered bottle, add 100 Gm. benzaldehyde, and shake well until a permanent emulsion is formed.

Allow to stand until the following day (15–20 hours), during which time the mixture solidifies owing to the separation of a mass of white crystals—potassium benzoate. Water is added with shaking until all the crystals have dissolved.

The mixture is next agitated with ether to remove the benzyl alcohol. Allow the ethereal layer to separate; repeat the extraction three or four times.

The mixed ethereal layers are washed with a small quantity of saturated solution of sodium bisulphite to remove any unchanged benzaldehyde. Separate the ether, and filter. The filtrate, which consists of a solution of benzyl alcohol and ether is evaporated (the ether may be recovered by distilling). The residual oil is almost entirely benzyl alcohol, and is fractionated by distillation. At first a little ether may be obtained; this is rejected, the greater part passes over between 204–207° C., and consists of pure benzyl alcohol.

Although usually stated in text books to be only very slightly soluble in water, it is dissolved to the extent of 4 per cent. The boiling point of benzyl alcohol is 206° C., therefore much higher than water. It is not decomposed at the temperature of boiling water, hence it may be sterilized at that temperature.

The Medical Journal of Australia, August 3, 1918, reports that "this new anæsthetic has been tested in the surgical clinic of Professor W. Halstead and elsewhere. A report of fifty cases dealing with the incision of abscesses, the excision of toe nails, the extraction of bullet from the hand . . . has demonstrated the efficiency of 1 per cent. aqueous solution as an anæsthetic."

THE PREPARATION OF ARSPHENAMINE (SALVARSAN).[1]

By Philip Adolph Kober.

I. Introduction.—The synthesis of an arsphenamine or salvarsan suitable for therapeutic purposes, in spite of the work of Ehrlich and Bertheim[2] and their collaborators, is still a vital problem. It is fairly well known that the toxicity of arsphenamine varies and that batches made by individual manufacturers vary more than can be accounted for by the differences in their procedures. Furthermore, since it seems fairly well proven that even Ehrlich's own manufacturers are unable to maintain a uniformly high standard,[3] it is evident that there are some factors which are not understood or not under control. I am informed by manufacturers of

[1] Read in part before the Society of Experimental Biology and Medicine, New York City, November 20, 1918. Reprinted from *The Journal of the American Chemical Society,* March, 1919.

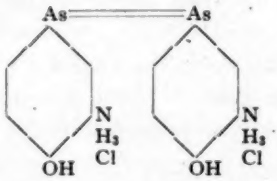
[2] *Ber.,* 45, 756, 1912.

[3] Roth, *Hygienic Laboratory Bulletin* 113, 7, 1918.

arsphenamine that about 50 per cent. of the arsphenamine made does not meet the Surgeon General's requirements[4] and therefore is not distributed.

In studying the subject, I came to the conclusion that the toxicity of arsphenamine or at least the variation of the toxicity is largely due to the use of methyl alcohol and ether in the final precipitation of the base as the dihydrochloride. While most chemists use Ehrlich and Bertheim's methyl alcohol and ether method or some modification of it for precipitating the dihydrochloride of salvarsan, not one will admit, or is willing to believe, that the dry product contains a molecule of methyl alcohol.

The theoretical amount of arsenic in arsphenamine as shown by the formula is 34.2 per cent., assuming that it is absolutely pure and contains no water or solvent in its crystal or solid form.



The German firm having a monopoly of the manufacture of the drug, tried at first to get the scientific public to accept its statement unchallenged of a 34 per cent. arsenic content. Analyses by others soon compelled them to abandon that claim and for seven years 31.6 per cent. (31.57 per cent.) has been and now is accepted as the arsenic content.

This different and smaller content of arsenic is in harmony with an assumption of two "molecules of water of crystallization" in the final dry substance.

This amount of water is given in the literature frequently and by the U. S. Health Service regulations[5] as an actual fact, and a higher content of arsenic, involving less solvent combined with the drug, is looked upon with suspicion.

I believe I have exhausted the references to the literature on this point, and I can find no justification for assuming two molecules of water in the drug, made by the usual and original directions.

[4] The U. S. Public Health Service, *P. H. Reports*, 33, 540, 1918, requires an M.L.D. of 0.060 g./kilo body weight, while the Surgeon General (recently) raised the requirement to 0.080 g./kilo, and to 0.100 g./kilo.

[5] *Public Health Reports*, 33, 540, 1004, 1918.

The reference or work chiefly if not wholly relied upon for this assumption is that of Gaebel.[6] Myer[7] and DuMez quote him also in support of the arsenic regulations of the drug. While other authors make arsenic estimations, Gaebel is the only author mentioned or that I can find, beside Ehrlich and Bertheim, who has made any experiments as to the solvent and its amount in the dry substance.

Gaebel passed hydrogen gas, purified, over 0.07966 Gm. salvarsan, contained in a glass-vessel called "Ente" (meaning goose-shaped), heated in an oven at 105° C.; the vapor coming off was tested only for hydrochloric acid with silver nitrate solutions. He weighed the "Ente" and noted the loss of weight. After 6 hrs. its weight became constant and the loss corresponded to 7.2 per cent. The theoretical loss for 2 molecules of water would be 7.6 per cent.

This one estimation apparently satisfied him for he records no duplicate estimation, and called the solvent thus lost water, apparently taking no account of the fact that arsphenamine was actually precipitated from methyl alcohol (undoubtedly anhydrous so as to mix with the ether) with non-aqueous ether. That Gaebel simply assumed it to be water, not knowing the method of Ehrlich and Bertheim used is indicated also by the fact that he published a year before Ehrlich and Bertheim published their method.

Against the statement that the solvent in the solid arsphenamine is water, are the words and experiments of Ehrlich and Bertheim.[8] They tested one preparation made with methyl alcohol and ether, in the same way all their preparations are supposed to be made, after drying the substance at 65° C. in a current of carbon dioxide. This temperature is about the boiling point of methyl alcohol. On dissolving this dried preparation in water and distilling over any volatile solvents they found methyl alcohol in appreciable quantities. They concluded upon this and other reliable analyses that it contained one molecule of methyl alcohol for every molecule of the arsphenamine.

In view of these facts, it seems fairly certain that arsphenamine made according to the original directions must contain methyl alcohol, unless, of course, it is removed by drying under more favorable conditions than Ehrlich and Bertheim used. The evidence in the literature gives one the strong impression that for commercial reasons its methyl alcohol content has been kept secret. The ob-

[6] *Apoth. Ztg.*, 26, 215–216, 1911.
[7] *Public Health Reports*, 33, 1004, 1918.
[8] *Ber.*, 45, 756, 1912.

jections to methyl alcohol and other considerations connected therewith will be discussed on page —. In order to eliminate the methyl alcohol or any other organic solvents in the process of preparation, the following method was developed:

II. METHOD OF PREPARATION.—Finding that the dihydrochloride of the arsphenamine base was insoluble in an excess of chlorides, as might be expected from the Law of Mass Action,[9] an excess of hydrochloric acid was tried in "salting" out the drug. When first tried, by making an aqueous solution of the dihydrochloride directly from the base, by dissolving in twice normal sodium hydroxide and adding a slight excess of hydrochloric acid and then pouring the solution of hydrochloride into a strong solution of hydrochloric acid (1–1), a white precipitate was formed which, however, soon turned to a dark-colored gum. This transformation of the white precipitate into the black gum, was due simply to the coalescence of the particles. This coalescence was prevented when the precipitation was conducted, (1) at a low temperature, (2) under more dilute conditions, and (3) with vigorous stirring.

As the purity of the hydrochloride depends also on the purity of the arsphenamine base, the details of this preparation will be briefly given; in other words, the process starting with the nitro-oxyphenyl-arsonic acid[10] will be described.

1. *Reduction of Nitro-Oxyphenyl-Arsonic Acid.*—Two hundred and twenty (220) grams of magnesium chloride are dissolved in 5,500 Cc. of distilled water and 1,100 grams of sodium hydrosulphite are quickly added, while stirring or shaking, in an eight-liter bottle.

To this solution is then added, with stirring or shaking, 85 grams of crude nitro-oxyphenyl-arsonic acid, dissolved in 290 Cc. of 2.0 *N* sodium hydroxide and diluted with 1,700 Cc. of water. The mixture[11] is then allowed to stand at room temperature or it is slowly

[9] Nernst, *Z. phys. Chem.*, 4, 372, 1889; Noyes, *ibid.*, 6, 241, 1890.

[10] Owing to the ease with which *p*-arsanillic acid can now be made, which is described in a separate communication (*Journal of the American Chemical Society*, 41, 300, 1919), we prefer to make nitro-oxyphenyl-arsnic acid by nitrating the oxalic acid derivative of *p*-arsanillic acid (*Ber.*, 44, 3095, 1911) and saponifying according to the directions of Ehrlich and his collaborators (*Ber.*, 44, 3451, 1911).

[11] These amounts of material and solution practically fill an eight-liter bottle, so that little, if any, inert gas is needed nor do other anaërobic precautions have to be taken.

warmed in a water bath at 40° C., until the suspension, first formed, seems to agglutinate and to be about to settle. The suspension matter seems to be impurities, mostly dark colored, from the nitro-oxyphenyl-arsonic acid; impurities from the hydrosulphite, also dark, and its reaction products; besides a little of the arsphenamine base. The total weight of the suspension, when filtered and dried, is rarely more than three to four grams, or four to five per cent. of the total yield.

When this stage is reached, the mixture is rapidly filtered, through hard paper, or alundum ware, and the clear, yellow filtrate digested, according to Ehrlich and Bertheim's directions, at 50° to 60° C. for two to two and a half hours, when the base—diamino-dioxyarsenobenzene — separates out as a yellow precipitate.

Some chemists lay great stress on using only the purest nitro-oxyphenyl-arsonic acid and only to treat it subsequently with commercial hydrosulphite, which itself, in many cases gives, if not a muddy solution, at least a dark colored one; all this in spite of Ehrlich and Bertheim pointing out, that the reduction, even with the purest nitro-oxyphenyl-arsonic acid, produces its own by-products. These chemists then rely on bone-black to remove all such impurities from the hydrochloride in methyl-alcohol solution.

This preliminary digestion of ours and filtering removes the impurities to such an extent, that with the exception of a slight white, mineral

FIG. 1.

Laboratory Anaërobic Filter.

The outer cylinder may be made of glass, and the inner cone of "alundum" ware. When not completely filled with liquid, inert gas such as hydrogen or nitrogen is introduced and the position of the filter reversed.

residue found in some hydrosulphites, no further filtering or removal of extraneous coloring matter is neecssary.

2. *Preparation of the Dihydrochloride.*—The crude diaminodioxyarsenobenzene, after filtering and washing with distilled water at 0° C., is transferred to a porcelain dish and suspended in 400 Cc. of distilled water, likewise at 0° C., where it is dissolved in the least quantity of two normal sodium hydroxide, usually about 150 Cc., which should be at 0° C. We find it convenient to prepare all the necessary solutions two or three days ahead of time and to keep them in an ice-box or refrigerator, at the end of which time they will be cold enough for the purpose.

The alkaline solution of the base is now filtered so as to remove any insoluble matter, like filter paper; any fibers of dust, and also, a small amount of the mineral precipitate, mentioned before, which is present when some hydrosulphites are used. For this purpose we have constructed a simple form of anaërobic filter, which is shown in Fig. 1.

To the perfectly clear alkaline solution of the arsphenamine, 150 Cc. of strong hydrochloric acid (1–1) at 0° C. are added, which throws out and re-dissolves the yellow base. The clear solution, resulting from the addition of the hydrochloric acid, contains the dihydrochloride, and, for the purpose of getting a fine precipitate, the solution is further diluted with distilled water at 0° C. in order to bring the volume of the final solution up to 1,700 Cc.

Into a stirring apparatus, 3,250 Cc. of hydrochloric (acid 1–1, *i. e.,* 1 part concentrated acid plus 1 part water) at 0° C. are placed. While vigorously stirring, the cold aqueous solution of dihydrochloride of arsphenamine is run slowly into this hydrochloric acid. The grey-white precipitate, now formed, is allowed to settle for an hour. It is then filtered in thin layers and dried in a vacuum desiccator at a low pressure, fused calcium chloride and solid sodium hydroxide in sticks or flakes[12] being used as absorbents. It is preferable to place the solid alkali separately in a dish surrounded by the calcium chloride. The heat of neutralization of the hydrochloric acid, undoubtedly, helps to a considerable degree to dry the substance quickly. After twelve or more hours hydrogen is introduced into the desiccator to equalize the pressure and the

[12] Flakes, containing 97 per cent. of sodium hydroxide can now be obtained for about 6 cents a pound.

arsphenamine is ground and further dried until of constant weight. The yield is about 75 per cent.

III. THE PRODUCT.—*Color.*—The substance prepared by the method just described is usually a greyish powder sometimes having a slight yellowish tint. When very pure it seems to have little or no color and is practically white in a dry state, and is possibly analogous to the color changes of cupric sulphate when made anhydrous.

Analysis.—Analyses of preparations having about 1 molecule of water in the final product are as follows:

Preparation.	Per Cent. As.[13]		Per Cent. N.		Per Cent. Cl.	
	Found.	Theory.	Found.	Theory.	Found.	Theory.
No. 2	32.67	32.85	...	...	...	...
No. 5	...	...	...	...	14.89	15.50
No. 12	32.89	32.85	6.37	6.13	14.09	15.50

Preparations with 2 molecules of water in the final product gave:

Preparation.	Per Cent. As.[13]		Per Cent. N.		Per Cent. Cl.	
	Found.	Theory.	Found.	Theory.	Found.	Theory.
No. 9	31.83	31.57	5.60	5.90	16.79	14.90
No. 10	31.83	31.57	5.64	5.90	14.09	14.90
No. 11	30.38	31.57	5.83	5.90	14.67	14.90

The analyses that Ehrlich and Bertheim obtained on their product are given below for the purpose of comparison. One analysis made by us of arsenobenzene is also given. The theoretical values are calculated on the basis of 1 molecule of methyl alcohol to 1 molecule of arsphenamine.

Preparation.	Per Cent. As.		Per Cent. N		Per Cent. Cl.	
	Found.	Theory.	Found.	Theory.	Found.	Theory.
Ehrlich and Bertheim's ...	31.99	31.85	6.06	5.95	14.51	15.07
Arsenobenzol No. 1449 ...	30.89	31.85	6.20	5.95	15.24	15.07

[13] The above results are in most cases the averages of the following analyses. The arsenic estimations were made according to the gravimetric method described in Treadwell-Hall (1914) and also in *Public Health Reports*, 33, 1003–1018, 1918. The nitrogen was determined according to the Kjeldahl method (modified Gunning), U. S. Department of Agriculture, *Bull.* 107, 8d, 1907. The chlorine was determined by fusing the product with two parts of potassium nitrate and one part of sodium carbonate and then proceeding according to Drechel modification of Volhard's method. Treadwell-Hall, 2, 707, 1914.

Ehrlich and Bertheim found that in the same preparation just mentioned the carbon content was 32.63 per cent. The theory for 1 molecule of methyl alcohol calls for 33.12 per cent. C., while the theory for 2 molecules of water requires only 30.32 per cent. C.

Qualitative Tests.—Of the qualitative tests suggested and compiled by Meyer[14] and DuMez, we have tried the following ones only, which we consider the most important, and obtained the reactions described in every respect:

Dilute sulphuric acid gave an insoluble hydrosulphate.

Nitric acid gave the characteristic color.

Preparation.	Per Cent. As.	Per Cent. N.	Per Cent. Cl.	Per Cent. Sulphur.
No. 9	32.01	...	...	
	31.86	...	...	
	31.62	...	...	
	31.95	...	...	
	31.21	5.60	16.84	
	32.32	5.67	16.75	
Average	31.83	5.63	16.79	
No. 10	31.02	...	...	
	31.62	...	...	
	32.11	...	...	
	32.34	...	...	
	31.77	5.64	14.18	
	32.11	5.64	14.00	
Average	31.83	5.64	14.09	
No. 11	30.43	...	...	
	30.90	...	...	
	30.25	5.78	14.72	
	29.93	5.88	14.63	
Average	30.38	5.83	14.67	0.30
No. 12	32.62	...	...	
	33.07	...	...	
	33.00	...	...	
	33.07	6.30	14.18	
	32.71	6.45	14.00	
Average	32.89	6.37	14.09	

Bromine water gave the color described.

Phosphotungstic acid gave the color reaction for phenols.

Silver nitrate gave the beautiful red colored complex described by Danysz.[15]

[14] *Public Health Reports*, 33, 1004, 1918.

[15] *Compt. rend.*, 157, 644, 1913; *ibid.*, 158, 199, 1914.

Magnesium mixture, used as described, showed no inorganic arsenic.

Mayer's reagent for alkaloids, gave the characteristic test.

Mercuric chloride showed the precipitate described.

Carbon dioxide precipitates the base from its alkaline solution, as is very characteristic for salvarsan, showing the presence of a very weakly acid substance.

Physical Properties.—The substance as soon as it is moistened with water becomes brownish yellow and dissolves in 5 parts of water to form a gel or gelatinous solution depending on the temperature. It is readily soluble in warm or hot water, slightly soluble in methyl alcohol, scarcely soluble in ethyl alcohol, insoluble in ether or benzene.

Melting Point.—It does not melt slowly when heated, but gradually darkens, beginning at 160° C.; when at about 180° C. it begins to char. Ehrlich and Bertheim state that their product decomposes, depending on the speed of heating at about 185–195° C. with charring.

Toxicity.—In general its other properties seem to be that of salvarsan in every respect. When tested by injection into rats according to the rules and standards recommended by the U. S. Public Health Service and adopted by the Federal Trade Commission,[15] it seems to have a relatively low grade of toxicity.

IV. General Discussion.—Our work on arsphenamine seems to show that the dihydrochloride, when pure and possessing only one or two molecules of water, is practically colorless. Samples of this colorless form can be shown and are easily prepared. Impure arsphenamine is tinted more or less, depending on the impurity and also on the physical form of the solid substance. Of the three commercial preparations made in America no two are alike in color. The Canadian Diarsenol is very yellow, the Metz preparation less yellow with a tint of green, while the Arsenobenzol has a light yellow tint.

The amount of yellow tint may be due to the sulphur content, as our gray substances have about one half to one fourth the amount of sulphur that is present in the ordinary yellow material.

The analyses of arsphenamine indicate that the amount of colored impurity in most preparations must be negligibly small, at most 1 per cent. or less. The toxicological studies also show that the

[15] *Public Health Reports,* 33, 540, 1918.

amount of colored impurities is small and negligible. In fact Ehrlich,[17] G. T. Morgan[18] and we in this laboratory have found that a very light-colored arsphenamine is sometimes very toxic compared to a darker preparation. Since it is possible also to alter the color of the solid form by changing its physical state, comparison of the color of different arsphenamines should be based on the color of the substance in standard solutions.

To sum up: The color of the solid arsphenamine seems to be due to a small amount of highly colored impurities in an otherwise colorless substance.

Our experience with the methyl alcohol and ether method has brought to our attention four possible objections against the use of these substances: These solvents are highly inflammable; they are expensive even in peace times; they are difficult to make pure, and finally methyl alcohol, ether and other solvents are easily oxidized to easily reducible substances. As a concomitant with arsphenamine, a substance easily oxidized to very toxic and therefore dangerous products, methyl alcohol and similar substances, are *a priori* not safe to use or have present.

The advantages of the hydrochloric acid method are:

(*a*) The medium of precipitation, both the water and the hydrochloric acid can be absorbed by common and inexpensive absorbents; they are not easily oxidized or reduced.

(*b*) It is an inexpensive method as the excess hydrochloric acid can be recovered ready for use by simple distillation.

(*c*) It requires no inflammable material.

(*d*) The reagents used are pharmacologically suitable and raise no question as to toxicity, such as does the use of methyl alcohol and ether.

(*e*) The product, being less hygroscopic, is less liable to oxidation and other chemical change, when exposed to the air, and is therefore more stable.

(*f*) The method, as some preliminary experiments show, can be used for reprecipitation, and from a chemical standpoint seems better calculated to eliminate impurities.

The same method is used to obtain sodium chloride of the highest purity for atomic weight work.

[17] *Loc. cit.*

[18] Longmans, "Organic Compounds of Arsenic and Antimony," 1918, p. 156.

My thanks are due to Mr. Leonard M. Wachter for making the special tests and for supervising the analytical work, and to Mr. F. W. Gilcreas for careful and painstaking analytical work.

V. SUMMARY.—(1) It is shown that there is no justification for Gaebel's assuming two molecules of "water of crystallization" in salvarsan made according to the directions of Ehrlich and Bertheim. While Gaebel made his assumption apparently in ignorance of Ehrlich's and Bertheim's method published a year later, no valid reason can be given for the general acceptance of that assumption since Ehrlich and Bertheim pointed out in 1912 that their preparation contained one molecule of methyl alcohol.

(2) A new method which is much less expensive and simpler than Ehrlich and Bertheim's method has been developed for the preparation of the dihydrochloride of arsphenamine base in pure aqueous solution by means of hydrochloric acid, being salted out similarly as in the precipitation and purification of sodium chloride with hydrochloric acid.

(3) The final product of the new method may have one or two molecules of water depending upon the drying. This seems to be the first time the dihydrochloride of the arsphenamine base has been prepared without organic or other solvents in combination or present in the final product.

FURTHER FACTS REGARDING ANTISCORBUTICS.[1]

Scurvy, a disease which once represented a menace of serious moment to large numbers of persons at certain seasons and under certain conditions, when "fresh" foods were not available in sufficient variety or abundance, has returned into prominence in recent years. Experience has shown that while the heating of milk for infant feeding may remove undesirable bacterial dangers from this essential food, it is liable at the same time to destroy certain undefined properties of the diet, in the absence of which scorbutic symptoms arise. Furthermore, under the conditions of food supply enforced in some of the theaters of war, the medical officers have also found themselves confronted with scurvy, both among the fighting units and among the inhabitants of devastated areas.

[1] Reprinted from the *Journal of the American Medical Association*, March 8, 1919.

Quite aside from all theories as to the etiology of the disease, experience has demonstrated effective methods for the cure or the prevention of scurvy. In this country orange juice has acquired a growing popularity as an antiscorbutic supplement to the diet of bottle-fed infants. The difficulties in maintaining a supply of oranges at a price within the reach of all classes of persons concerned have been aggravated by the interference with normal transportation during the period of the war. This has, in fact, occasioned much concern among pediatricians in various centers. The possibility of desiccating or preserving the juice in some way at the source of supply in order to insure a more dependable distribution of orange juice has encountered the obstacle of uncertainty raised by recent studies on the instability of antiscorbutic properties when vegetables exhibiting them are dried.[2] Thus the desiccation of cabbage seems to deprive it of antiscorbutic potency unless the drying is carried out at low temperatures and with special precautions. Chick and Rhodes,[3] of the Lister Institute for Preventive Medicine in London, have recently found, in searching for possible substitutes for the highly efficient orange juice, that fresh grapes are of little value as antiscorbutics; of the raw vegetable juices examined, raw swede juice proved to be far the most potent, approximating in value to orange juice; the raw juice of carrots was found to be much inferior, and that of beet roots practically negligible in value, so far as acceptable dosage is concerned.

From a practical standpoint the discovery of this potency of swede juice seems to be important because it promises to afford a valuable, inexpensive source of antiscorbutic material. According to the English investigators, the value of swede juice is not markedly inferior to that of fresh orange juice, so that it may be regarded as a satisfactory substitute. Its value approximates ten times that of the raw carrot and more than ten times that of the raw beet root juice. Chick and Rhodes add that swede juice has been adopted in some of the English infant welfare centers, and there does not appear to be any drawback to its use in infant feeding. Curiously enough the swede belongs to the natural order Cruciferæ, which also

[2] "Scurvy and Antiscorbutics," editorial *J. A. M. A.*, 71, 2000 (December 14, 1918).

[3] Chick, Harriette, and Rhodes, Mabel, "An Investigation of the Antiscorbutic Value of the Raw Juices of Root Vegetables with a View to their Adoption as an Adjunct to the Dietary of Infants," *Lancet*, 2, 774 (December 7), 1918.

includes the cabbage, perhaps the most potent of all antiscorbutic vegetables investigated.

In the case of adults living under conditions in which fresh foods are not available, a belief in the antiscorbutic potency of the juice of the West Indian lime has been cherished for decades. Arctic explorers, ships starting on long voyages without access to land, and expeditions away from sources of appropriate food supplies have been accustomed to be equipped with lime juice preserved in various ways; and there are records to show that vigorous steps were sometimes taken to enforce the actual injection of the dosage as ordered. The efficacy of this preventative therapy has been far from universal; and an explanation seems to be afforded by recent investigations, also conducted at Lister Institute, by Chick[4] and her coworkers, to whom we are already indebted for valuable contributions to the prevention of scurvy. Preserved lime juice was found useless for the prevention of scurvy by the methods employed. The fresh limes have some potency; but it has now been shown that, volume for volume, their juice is only about one fourth as effective as is lemon juice. Curiously enough, a historical study of the reported cures of scurvy with lime juice shows that the agent employed in several authenticated cases was in reality the juice of the lemon. There are instances of severe scorbutic outbreaks despite the liberal use of lime juice. This demonstrated virtue of the lemon, a fruit so widely employed in the household in modern life, affords an added illustration of the unique value of many items of diet, like certain fruits and green vegetables, for which we pay a high price despite the fact that they give no equivalent return in calories. Instinctively, perhaps, we have come to include in our dietaries articles of food which have a high physiologic value that cannot be measured in the current term of food units.

[4] Chick, Harriette, Hume, E. Margaret, Skelton, Ruth F., and Smith, Alice H., "The Relative Content of Antiscorbutic Principle in Limes and Lemons, Together with Some New Facts and Some Old Observations Concerning the Value of 'Lime Juice' in the Prevention of Scurvy," *Lancet*, 2, 735 (November 30), 1918.

CURRENT LITERATURE.

SCIENTIFIC AND TECHNICAL ABSTRACTS.

STAINING DIPHTHERIA BACILLUS WITH TOLUIDINE BLUE MIXTURE.—The staining solution which Sutherland has used for eight years has the following composition: Toluidine blue, 0.1 Gm.; glacial acetic acid, 0.5 Cc.; distilled water, 100 Cc. The smears are made on slides and fixed with heat in the usual way. When large numbers of cultures have to be examined, it is the most convenient to make the smears in a series of ten or twelve at one time. A drop of the stain is placed on each film and a cover glass is then placed over the preparation. The excess of stain is removed by blotting each slide between two layers of blotting paper immediately before being examined. The first slide is ready for examination about one minute after the stain is applied, and the others are taken in rotation. The best results are obtained by using strong artificial light. When slides are stained in this way the polar granules of *B. diphtheriæ* are of a deep reddish purple, while the bodies of the bacilli appear faintly blue. Most of the organisms found in diphtheria swabs, including Hoffman's bacillus, are more faintly stained, so that *B. diphtheriæ* is readily detected when present only in small numbers. The stain may also be used in a similar manner for demonstrating the bacillus in smears made direct from the swabs, in which case the film should be allowed to stand in the stain for from two to three minutes before removing the excess. (From *Lancet,* London, February 8, 1919, through *Jour. Amer. Med. Asso.,* March 15, 1919.)

OPIUM ANALYSIS.—D. B. Dott. The author criticises and discusses the paper by Annett and Singh (*Analyst,* 1918, 43, 205), in which these writers contend that the B. P. method of morphine estimation in Indian opium gives low results, mainly owing to the presence of codeine exerting a solvent action on the morphine and preventing its precipitation by ammonia from a solution of the lime compound. The author contends that it is hardly correct to speak of precipitation by ammonia, the morphine being really precipitated, because the chlorine of the ammonium chloride combines with the calcium, and the morphinate of lime, being decomposed, causes the precipitation of the morphine in the saline solution in which it is

very slightly soluble. Whatever may be the solvent action of codeine on morphine in aqueous solution, assay conditions are different, in that sufficient ether is present to hold all the codeine in solution. Annett and Singh's procedure of shaking the lime solution with toluene before treating with ether and ammonium chloride was tried, using benzene in place of toluene, with the resulting production of a frothy emulsion which makes extraction troublesome. This emulsion probably contains a small quantity of a basic lime compound which is readily separated by filtration, but is greater in quantity and more impure than the trace which always forms when using the B. P. process, where benzene is not employed. On comparing the two precipitates (the B. P. and the benzene treated), the latter, although heavier, shows on ultimate titration no more, and it may be slightly less than the former, and it is concluded that there is no sufficient reason for altering the process in the direction suggested by Annett and Singh. (*Pharm. J.*, 1918, 101, 318, through *The Analyst*, February, 1919.)

Estimation of Aldoses in Alkaline Solution.—The method of H. Colin and O. Liévin depends on the fact that, under certain conditions, dextrose is oxidized quantitatively to gluconic acid by iodine in alkaline solution. The alkalinity must be sufficiently faint to eliminate risk of oxidizing the alcohol groups. The author uses a solution containing 35 Gm. of sodium phosphate and 50 Cc. of $\frac{N}{10}$ sodium carbonate in a liter. To the solution to be analyzed at least three times as much $\frac{N}{10}$ iodine are added as will suffice to oxidize the dextrose believed to be present, and then a volume of the alkali solution about double that of the $\frac{N}{10}$ iodine. After an hour the mixture is made faintly acid with sulphuric acid, and the excess of iodine titrated with thiosulphate. Proteins, tannin, and coloring matters which may react with iodine must first be removed. Usually, careful treatment with the least possible excess of lead acetate will suffice to remove the interfering substances occurring in the inulin-bearing roots, tubers and the like, for the analysis of which the method was worked out. (*Bull. Soc. Chim.*, 1918, [IV], 23, 403–405; through *The Analyst*, February, 1919.)

Iodimetric Estimation of Hypophosphites and Phosphites. The method proposed by Boyer and Bauzil is based on the fact that hypophosphorous acid is oxidized by iodine in acid solution to

phosphorous acid; the latter is not further oxidized in acid solution, but if an alkali (sodium hydrogen carbonate) is added the oxidation proceeds a stage further to phosphoric acid. *Hypophosphites.*—Ten Cc. of the solution containing 0.1 Gm. of the hypophosphite (hypophosphites which are insoluble in water may be dissolved in dilute sulphuric acid) are placed in a stoppered flask, and treated with 10 Cc. of 25 per cent. sulphuric acid and 30 Cc. of $\frac{N}{10}$ iodine solution; the mixture is kept in a dark place for ten hours, and the excess of iodine is then titrated with $\frac{N}{10}$ thiosulphate solution. Each Cc. of $\frac{N}{10}$ iodine is equivalent to 0.00328 Gm. of hypophosphorous acid (H_3PO_2). *Phosphites.*—Ten Cc. of the solution, containing about 0.1 Gm. of the salt, are treated with 10 Cc. of 5 per cent. sodium hydrogen carbonate solution and 20 Cc. of $\frac{N}{10}$ iodine solution; after two hours, 10 Cc. of 10 per cent. acetic acid are added, and the excess of iodine is titrated. Each Cc. of $\frac{N}{10}$ iodine is equivalent to 0.00407 Gm. phosphorous acid. The method may be applied to mixtures of the two salts. (*J. Pharm. Chim.*, 1918, 18, 321, 334; through *The Analyst,* February, 1919.)

Constituents of Oil of Cassia—II.—F. D. Dodge. The author has identified benzaldehyde and methyl salicylaldehyde in oil of cassia. Neither of these substances has previously been shown to be present. In collaboration with Sterndale, the author has previously shown (*J. Ind. and Eng. Chem.*, 1915, 7, 155) that oil of cassia contains salicylic aldehyde (0.1 to 0.2 per cent.) coumarin benzoic acid, salicylic acid, and a liquid acid of fruity odor, not further identified. In addition to the above named substances, it has long been known that oil of cassia consisted mainly (75 to 90 per cent.) of cinnamic aldehyde, and that cinnamyl acetate and methyl ortho-coumaric aldehyde were present, whilst it has been stated, but scarcely proved beyond doubt, that phenylpropyl acetate is or may be present. (*J. Ind. and Eng. Chem.*, 1918, 10, 1005–1006. Reprinted from *The Analyst,* March, 1919.)

Antiseptic Value of Some Essential Oils.—L. Cavel. For each essential oil the minimum quantity was determined which was found necessary to prevent all bacterial growth in ordinary neutralized meat broth plentifully sprinkled with water from a septic source. The inhibiting quantity of phenol under the same experimental conditions being 5.6 parts per 1.000, the author obtained the

following classification for the essential oils: Thyme 0.7 part per 1,000, marjoram 1.0, orange-peel oil 1.2, verbena 1.6, cassia 1.7, rose 1.8, clove 2.0, eucalyptus 2.25, mint 2.5, geranium (rose de France) 2.5, vetiver 2.7, bitter almond 2.8, gaultheria 3.0, geranium (Indian) 3.1, wintergreen 3.2, meadow-sweet 3.3, spike-lavender 3.5, aniseed-tree 3.7, iris 3.8, common cinnamon 4.0, wild thyme 4.0, birch 4.8, anis 4.2, mustard 4.2, rosemary 4.3, cumin 4.5, neroli 4.75, lavender 5, balm 5.2, ylang-ylang 5.6, juniper 6.0, sweet fennel 6.5, reseda 6.5, garlic 6.5, lemon 7.0, cajeput 7.2, sassafras 7.5, heliotrope 8.0, cedrate 8.4, turpentine 8.6, parsley 8.8, violet 9.0, camphor 10.0, angelica 10.0, patchouly 15.0. Seven months after inoculation the culture plates were still sterile when the above quantities were used. (Cf. *Analyst,* 1918, 43, 171. *Comptes rend.,* 1918, 166, 827–829; through *Inter. Rev. Sci. Prac. Agric.,* 1918, 10, 1151. Reprinted from *The Analyst,* March, 1919.)

MEDICAL AND PHARMACEUTICAL NOTES.

"Linseed Serum" for Burns.—The following *Linosérum* is recommended by J. Bandaline and J. de Paliakoff as a dressing for burns. The serum must be applied fresh the same day as it is prepared, and should be combined with hot air douches.

Infusion of linseed (1.5 per cent.)	1,000 Gm.
Chloride of sodium	9 Gm.

Filter and sterilize. (*Union Pharm.,* 1918, 59, 284, September; through *The Prescriber,* February, 1919.)

Rheumatism and Mouth-breathing.—T. M. Allison holds that rheumatism is invariably connected with mouth-breathing, and that the curative treatment of that complaint is the employment of gargles in addition to salicylates. He recommends the following:

℞ Acid. carbol. liq.	ʒ iv
Aq. chloroformi	ad ʒ viii

Ft. garg. Sig.—"Half a teaspoonful in a glass of water as a gargle night and morning."

B. M. J., 1918, 2, 421, October 12; through *The Prescriber,* February, 1919.)

Scabies.—G. Milian recommends the following ointment as more absorbable than sulphur ointment:

Potassium sulphide	50 Gm.
Water	250 Gm.

Dissolve and incorporate with

Soft paraffin	250 Gm.
Lanolin	250 Gm.

Afterwards add

Zinc oxide	5 Gm.
Liquid paraffin	200 Gm.

(*Paris méd.*, May 18, 1918; through *The Prescriber*, February, 1919.)

CASTELLANI'S MIXTURE.—This preparation, reported on by Guerrero *et al.* as of value in the treatment of yaws, has the following formula:

℞	Antimon. tartarat	0.065 Gm.
	Sod. salicylat.	0.65 Gm.
	Potass. iodid.	4.00 Gm.
	Sod. bicarb.	1.00 Gm.
	Aquam ad	30.00 Gm.

This quantity is given in one dose, diluted in 4 ounces (120 Cc.) of water, thrice daily, to adult natives, one third or less to children, and half doses to Europeans. Pharmaceutically the mixture is not elegant: it is cloudy and has a sediment of antimony oxide. This, however, disappears on dilution, or may be avoided by the addition to the formula of 8 Cc. of glycerin. Castellani's original article is abstracted in *The Prescriber*, 1916, p. 264. (*Philippine Jour. Science*, 1918, 13, 191, July; through *The Prescriber*, February, 1919.)

DAKIN'S SOLUTION: A NEW FORMULA.—The accepted formula for Dakin's solution[1] consists of chlorinated lime, sodium carbonate, sodium bicarbonate and water. The lime is mixed with water and allowed to settle; the sodium salts are dissolved separately in another quantity of water and the solution added to the lime suspension; the precipitated calcium carbonate is allowed to settle, and the clear fluid siphoned off. Notwithstanding the fact that in this formula the chlorinated lime has first to be titrated to ascertain the percentage of available chlorine, and the quantity of sodium salts

[1] See *American Journal of Pharmacy*, 1917, Vol. 89, pp. 396 and 497.

adjusted according to this percentage. C. Pagel (*Bull. des Sc. Pharm.*, 1918, 25, 263, Sept.–Oct.) considers that this solution is too alkaline, and he recommends the following modification: Mix the required quantity of chlorinated lime with the water, and filter off the clear liquor. Dissolve the sodium carbonate separately in water, and mix the solutions. Filter off the precipitated calcium carbonate, wash, and treat the precipitate with hydrochloric acid to form a solution of calcium chloride. The solution of sodium hypochlorite is then exactly neutralized with the calcium chloride solution. The product, he says, contains 0.5 to 0.6 per cent. of active chlorine, and is very stable. It has given great satisfaction in the hospitals in which it has been used. (From *The Prescriber,* February, 1919.)

PASTE FOR ULCERATED WOUNDS.—With a view to supersede the old-fashioned occlusive dressing with strips of plaster in the treatment of ulcerated wounds (note syphilitic), Mórlet (*Presse méd.*, September 12, 1918) has devised the following paste:

Balsam of Peru	15.0 to	20.0 Gm.
Bismuth subnitrate	15.0 to	20.0 Gm.
Fish glue		50.0 Gm.
Glycerin		50.0 Gm.
Water		100.0 Gm.

This paste is absorbent and porous, constituting a semi-occlusive dressing which, while tending to dry the wound, also allows any pus formed to pass out. The wound is first cleansed with alcohol and its margins loosened; a bandage impregnated with the hot paste is then applied, covering the wound, and the dressing allowed to remain for from twelve to fifteen days. Usually one or two dressings are required, rarely three. The patient may walk about during the course of the treatment, the act of locomotion having the effect of an actual massage of the wound. (From *The Prescriber,* February, 1919.)

BENZYL ALCOHOL AS A LOCAL ANÆSTHETIC.—The value of benzyl alcohol, phenmethylol, or methyl-hydroxybenzene, $C_6H_5 \cdot CH_2 \cdot OH$, is reported on by D. I. Macht (*Jour. Pharmacol. and Exper. Therap.*, 1918, II, 263, Apr.) who concludes that it possesses powerful local anæsthetic properties with a very low toxicity. He considers that these properties, together with the simple excretion of the drug by the organism and the ease with which solutions

may be sterilized, are strong reasons for its use in surgery. Benzyl alcohol is a liquid with a faint aromatic odor, slightly soluble in water (1:25), and miscible in alcohol or ether in all proportions. A 4 per cent. solution in water or in normal saline solution is practically non-irritant and non-toxic, and may be used in the same way as other local anæsthetics. Owing to the high boiling point of benzyl alcohol (over 200° C.), the aqueous solution may be sterilized by boiling without loss of strength. The absence of toxicity is due to the fact that it is metabolized in the organism and excreted in an innocuous form. The drug is inexpensive, and is certainly deserving of further trial. (From *The Prescriber,* February, 1919.)

MARYLEBONE CREAM (*J. P.*, 8/4/18).—Cremor Maryleboniensis, as given in the St. Marylebone General Dispensary Children's Pharmacopœia, 1913, is as follows:

Linseed oil	1 ounce.
Benzoic acid	½ grain.
Gluside (saccharin)	½ grain.
Oil of bitter almonds	1 minim.
Decoction of Irish moss	2 ounces.

Dose: Half to one teaspoonful to be added to each bottle of diluted milk. This preparation is recommended as a substitute for cream in infant feeding. (From *The Prescriber,* February, 1919.)

PROFLAVINE OLEATE IN TREATMENT OF WOUNDS.—Berkeley and Bonney draw attention to the value of proflavine oleate in the treatment of certain war wounds, notably those in which an exceedingly tender raw surface of considerable extent exists, the dressing of which is productive of acute pain. Their method consists in either spreading a thick layer of the oleate ointment on a single thickness of white gauze and then applying it to the wound, or spreading the oleate direct on to the surface of the wound and then covering it with a single layer of gauze. This dressing does not need to be changed for several days, and, when it is removed, strips off the sensitive surface without any dragging or pain. It is equally applicable to any large flat-surfaced wounds, such as those left after wholesale excision of the thigh or buttock muscles and so forth. The authors suggest that after all operations in which a flat raw surface is necessarily left, the wound should, from the first, be dressed with proflavine oleate, in the manner described. (*British*

Medical Journal, London, February 8, 1919; through *Jour. Amer. Med. Asso.,* March 15, 1919.)

FLY KILLERS.—Boyé and Guyot describe extensive research on and means to abate the fly nuisance. The practical conclusions are that castor oil and arsenic are the best fly killers. Castor oil containing a little sugar attracts the flies and they die in and around it. Its action is enhanced by adding 20 drops of croton oil to 30 Gm. of the castor oil. The fly dies almost instantly, while the oil is not dangerous for man. The odor of sugar and the odor of decomposing milk, flesh, or blood, seem to attract flies most powerfully. (*Bulletin de l'Académie de Medécine,* Paris; through *Jour. Amer. Med. Assoc.,* March, 1919.)

ANNUAL MEETING OF THE PHILADELPHIA COLLEGE OF PHARMACY.

The annual meeting of the college was held on Monday afternoon, March 31, 1919.

In his annual report, President Howard B. French presented a review of the year's work of the college and some of the special problems of the management. The following is an abstract of this interesting address:

During the past year the college has been doing extraordinary work by serving the government in many ways. Many of its students and alumni and several members of the faculty entered the government service in the army, navy, marine corps or in civil positions. Some have paid the extreme sacrifice, and to their memory we give all honor. To those who have returned disabled it becomes our duty to aid in every possible way to put them in positions where they can earn a competent and comfortable livelihood.

It is fitting that a proper and lasting memorial should be created in honor of those of our number who have so nobly gone forth to the service of their country, and a tablet placed on the walls of the college would seem a suitable memorial.

The war conditions have reduced very considerably the number of students in attendance and the solving of other problems growing out of the war conditions has caused your board of trustees much anxiety.

The college was able to render assistance to the government in the training of naval hospital corpsmen. One hundred and fifty such naval students were assigned to it, and this class was known as the United States Naval Hospital Corpsmen Training School of the Philadelphia College of Pharmacy, and was under the command of Lt. W. T. Minnick (M.D.), U.S.N. The course was intensive and practical and lasted about three months. Universal commendation was given to all connected with this work for the competent manner in which the unusual situation was managed.

A second class of thirty selected students was sent to the college and are now undergoing the same careful training.

During the year a number of the members of the faculty cooperated in the important work of examining medical, chemical and pharmaceutical supplies for the U. S. Army Supply Depot in this city and thus saved the government material expense. It is but proper that recognition should be given Professors LaWall, Stroup, Sturmer and Cook for their active coöperation in this work.

The reports from the departments show that the instruction has been kept fully up to the standard of former years, and a number of the faculty have assumed advanced positions in their teachings.

Although the advanced classes have been smaller and the special students fewer in number this year, twenty-one students were enrolled in the technical chemical course. It is interesting to note that a Japanese student has been taking special instruction in the preparation of toilet articles. He has taken a comprehensive course of instruction in this line and will be able to make many commercial products. The facilities created for this particular work will establish a basis for further instruction in this direction.

The leave of absence granted the librarian last June to temporarily accept government service, has prevented the usual report. The librarian has given as much attention as possible to the care of the library so as to keep the department in a satisfactory condition.

The secretary reports that during the year there were elected 134 active members and 83 associate members. This unusual number elected was largely due to the extra efforts made by the Alumni Association. During the year five members have died: James L. Bispham, of Philadelphia, a member for 64 years; C. Halsey Bogert, of Philadelphia; Roy L. Clark, of Utah; James H. Allan, of Maryland, and J. Oscar Burge, of Tennessee.

In order to increase the facilities of your institution it has been

deemed wise to secure amendments to the charter so as to broaden its scope and to provide for all of the various branches taught in the college.

We cannot overlook the fact that we are approaching our hundredth anniversary. Some of the alumni have thought it prudent to create a sustaining fund, and have arranged to begin active work in that direction. Members of the board and other friends are using their efforts to create a building fund of sufficient size to erect new buildings upon a proper site when obtained. Great work is to be accomplished and every effort must be put forth for a successful conclusion.

Appreciation is expressed for the active coöperation and assistance rendered by the faculty during one of the most trying years that the college has ever experienced and also to the members of the board of trustees for their most earnest and active support.

Annual Reports.

Committee on Publication.—A detailed report of the financial condition and of the circulation of the American Journal of Pharmacy was presented, likewise an estimated budget for the year 1919–20. The circulation of the Journal was very materially increased during the year and considerable more revenue was derived from advertisements.

Editor's Report.—The year that has elapsed since the last annual meeting of the college and the prior report of the editor has been marked by the occurrence of epochal making events that must ultimately affect the readjustment of the social and economic status of the world as well as the political destinies of many nations. Pharmacy as one of the vocations directly associated with current events, in that it necessarily serves the present needs of the people, is bound to be influenced in its trade and practices by the existing unrest. It becomes thus a part of the duty of pharmaceutical journalism to influence as greatly as is possible the events affecting pharmacists and the drug trade so that the demoralizing effects of govenmental errors and popular misunderstandings may be minimized.

The sense of this responsibility has impelled your editor to discuss current events relating to pharmacy in the editorial columns. In thus deviating from what had become almost a traditional policy of the Journal, his judgment based upon an earnest internal deliberation on the subject, was that the American Journal of

PHARMACY as a leading exponent of ethical pharmacy, could not refrain from giving proper consideration to important subjects and events influencing in any manner the services that pharmacists rendered to society.

The aim has been to maintain the AMERICAN JOURNAL OF PHARMACY as a true "Record of the Progress of Pharmacy and the Allied Sciences." That this has met with the approval of our contributors is evidenced by the list of the authors in the Index to the ninetieth volume. Despite the war conditions, the material available for publication necessitated the printing last year of 913 pages exclusive of the advertising. The varied character of the articles and subjects considered in that volume for 1918 is attested by the numerous titles in the index. It is believed that the JOURNAL is more extensively read than ever and it is noteworthy that many of our articles are republished of abstracted in other journals.

It is apparent that with the broadening of the scope of the JOURNAL that it is becoming less and less merely the medium of promulgating the actions of the college and is ceasing to be simply the journal of the Philadelphia College of Pharmacy, but that it is filling more faithfully, if possible, the sphere of an ethical pharmaceutical journal with an international reputation. It is believed that in performing this service professional pharmacy as a whole is benefited and that the college thus adds materially in advancing pharmacy and must indirectly in the end have not only that satisfaction that comes from altruistic service but likewise its due share in the reward.

The business management of the JOURNAL has rendered most efficient coöperation with the editor and the efforts to upbuild the circulation and the advertising patronage will doubtless eventually meet with the success merited. In the meantime, the joint work of the two departments will be continued and no pains will be spared to make the JOURNAL influential and progressive at a minimum of expense to the college. The report of the Publication Committee deals more specifically with this phase of the work.

Your editor is more concerned with the problems associated with making the JOURNAL of value and practical service to all branches of the drug trade and contributions, suggestions and constructive criticisms having that end in view are welcomed.

Committee on Necrology.—Reported deaths of members during the year as mentioned in the president's address, with concise memoirs and data of importance to the records of the college.

Committee on Nominations. Reported a list of nominees to be voted for as officers and trustees.

On behalf of the estate of Professor Joseph Remington, Professor LaWall presented a large photograph album containing the portraits of many of his prominent pharmaceutical associates; also a number of pieces of apparatus used in the lectures of the late dean. The thanks of the college were tendered the donors.

On motion of Professor LaWall the suggestion of President French that a memorial tablet to "our boys" be placed on the walls of the college, was referred to the board of trustees for action.

Mr. George M. Beringer, chairman of the board of trustees, presented amendments to the charter that were deemed necessary in view of the many advances made in the college work since the charter was amended in 1878. These amendments, four in number, were thoroughly discussed, acted upon, and severally adopted, as follows:

1. That the title of the college be changed from the "Philadelphia College" to "Philadelphia College of Pharmacy and Applied Sciences."

2. "That all restrictions as to the amount of income from any estate of the college be removed."

3. "That courses comparative to those given by universities and colleges in their scientific departments and by schools of applied sciences be instituted, and that degrees be awarded to our graduates from such courses agreeing with those awarded by such educational institutions for equivalent courses, and honorary degrees in pharmacy and in the sciences upon those meriting such distinction."

4. "That the number of trustees be increased from eighteen to twenty-four."

The officers of the college and the solicitors were empowered to take the necessary steps to secure these amendments to the charter.

Election of Officers, Trustees and Committees.—A ballot was taken and the following officers and committees were elected:

President—Howard B. French.
1st Vice-President—R. V. Mattison, M.D.
2d Vice-President—Joseph L. Lemberger.
Treasurer—Warren H. Poley.
Corresponding Secretary—A. W. Miller, M.D.
Recording Secretary—C. A. Weidemann, M.D.
Curator—Heber W. Youngken.

Editor—George M. Beringer.

Librarian—Katharine H. Nagle.

Trustees Elected for Three Years.—Samuel P. Sadtler, Wm. L. Cliffe, H. K. Mulford.

Publication Committee.—Joseph W. England, Chas. H. LaWall, Geo. M. Beringer, John K. Thum, J. W. Sturmer, R. P. Fischelis, E. F. Cook.

Committee of Pharmaceutical Meetings.—C. B. Lowe, M.D., Geo. M. Beringer, Chas. H. LaWall, E. Fullerton Cook, John K. Thum.

The following appointments were made by the president:

Committee on By-Laws.—George M. Beringer, Joseph W. England, C. A. Weidemann, M.D.

Delegates to the Pennsylvania Pharmaceutical Association.—Charles H. LaWall, chairman, Freeman P. Stroup, F. X. Moerk, E. Fullerton Cook, J. W. Sturmer, O. W. Osterland, John K. Thum.

Delegates to the New Jersey Pharmaceutical Association.—George M. Beringer, chairman, C. B. Lowe, Charles H. LaWall, J. W. Sturmer, H. W. Youngken.

Delegates to the Delaware Pharmaceutical Association.—A. W. Miller, chairman, C. B. Lowe, H. J. Watson, S. L. Foster.

C. A. WEIDEMANN, M.D.,
Recording Secretary.

BOOK REVIEWS.

CHEMISTRY IN OLD PHILADELPHIA. By Edgar F. Smith, University of Pennsylvania. Printed by the J. B. Lippincott Company, Philadelphia, Pa., 1919.

In this small book of 106 pages the facile pen of Provost Smith has presented a very interesting and instructive story. The author, one of America's leading chemists and educators, demonstrates anew that the true scientist and student loves to delve into the historical mines of science and learns much from studying the characters, life works and services of those who, in the past, were devotees of the sciences in which he is now working.

The book presents in a most inviting manner the status of the knowledge of chemistry and physics and of some of the theories prevailing, in the colonial days and in the early period of the exist-

ence of the American Republic. Even in those early times, Philadelphia appears, as later, to have been the center of scientific learning in the western hemisphere, and the early chemists of the City of Brotherly Love were renowned as leading and influential citizens who made their impress upon scientific progress as well as upon the political events of the time.

To a Philadelphian, Dr. de Normandie, is ascribed the honor of having written the first chemical paper to appear in print in this country. In 1769, the University of Pennsylvania instituted the first chair of chemistry in America and Dr. Benjamin Rush was the first professor of chemistry in this country.

The individual contributions of the early Philadelphia chemists in behalf of their chosen science is necessarily presented in rather a cursory manner. A brief recapitulation, such as is permissible as within the scope of a review, may not be amiss.

Dr. Benjamin Rush, a leader in medicine. His greatest service possibly was in directing the attention of medical students to the value of cognate chemical studies.

Dr. Joseph Priestly, who emigrated from England in 1794 and thereafter established a permanent residence in Pennsylvania and whose influence in stimulating the study of chemistry at this time was paramount, encouraged a number of the Philadelphia scientific circle to apply themselves to experiment and chemical studies.

Thomas P. Smith, whose early contributions were full of promise and whose lifework was prematurely cut off at the age of twenty-five years.

James Woodhouse, who aided materially by his writings in the overthrow of the old doctrine of phlogiston and whose experimental work did much to establish true ideas concerning combustion, respiration and oxidation. His studies added much to our knowledge of the chemistry of plants. He also analyzed many minerals and it is stated first isolated the metal potassium.

Adam Seybert, renowned as a chemist and as a member of Congress from Philadelphia. He was a pioneer in air analysis and he, likewise, laid the foundation for physological chemistry. In his later life he devoted his attention very largely to mineralogy.

His son, Henry Seybert also took up the study of minerals, "earnestly proceeded in his father's footsteps" for some years, until philanthropy, religiously observed, became almost his sole absorbing task.

Dr. John Redman Coxe, a noted medical practitioner, succeeded Dr. James Woodhouse as professor of chemistry in the University of Pennsylvania.

The disputative Thomas Cooper, a naturalized citizen of English birth and education, dabbling alike in politics, law and chemistry he served for a time as a district judge and as professor of chemistry in Dickinson College and later as the holder of the chair of chemistry and mineralogy in the University of Pennsylvania which he resigned and took up a professorship in a southern college.

Gerard Troost, a scholar said to have possessed a lovable personality; doctor of medicine and master of pharmacy by reason of education in European universities. He was noted for his profound knowledge and for his genius as an organizer and teacher. As one of the founders of the Academy of Natural Sciences of Philadelphia, he served as its first president and guiding spirit for a number of years. He was the first professor of chemistry in the Philadelphia College of Pharmacy. He specialized in the study of mineralogy and geology. In 1828, he left Philadelphia, to assume the professorship of chemistry in the University of Nashville and thereafter assiduously devoted himself to the study of his favorite branches. His published work in geology is considered authoritative and his life work is highly rated.

Professor William H. Keating, of the University of Pennsylvania, was another mineralogic chemist of high scentific attainment and interested greatly in the larger public affairs of his time.

Joseph Cloud smelter at the U. S. Mint whose work was largely concerned with the noble metals and the problems associated with the fusing points of metals and alloys.

The last name considered with the older chemists of Philadelphia is that of Professor Robert Hare. His contributions to chemical and physical sciences were not excelled by any of his predecessors mentioned and have scarcely been outclassed by any one whose name has yet been associated with the development of these branches of science. To him are we indebted for the compound blowpipe, the oxy-hydrogen flame, the first electric furnace, artificial graphite, calcium carbide, the mercury cathode and the rock blasting device. Many of these discoveries and inventions are even now in daily application in some of our most important industries.

The pen pictures of the author show that these men were not only influential in the development of chemistry but that they were

also factors in promoting other scientific and educatonal interests. The chemical societies of the time, the American Philosophical Society, the Academy of Natural Sciences, the Franklin Institute, etc., all reflected their activities as well as did the literature of the time which contained their published records of experiments and advances.

As we complete the perusal of this interesting contribution to the history of "Old Philadelphia" and the olden chemistry, we cannot refrain from expressing the wish that the author will continue his studies along these lines and write in the same fascinating style of the life works of the chemists who have worked in Philadelphia and vicinity in the succeeding decades to those considered in "Chemistry in Old Philadelphia."

G. M. B.

MANUAL OF LABORATORY PRACTICE FOR STUDENTS OF PHARMACY. By George B. Kaffman, BSc., Ph.D., James H. Beal, D.Sc., Phr.D., and Julius A. Koch, Ph.D., Phr.D. Third edition, 92 pages, interleaved. Published by The Midland Publishing Company, Columbus, Ohio. $1.50 plus postage.

A new edition of this laboratory guide for pharmacy students has just been published. The table of contents indicates its scope: "Physical operation," embracing weights and measures, specific gravity, the use of heat, melting and boiling points, and distillation. Then about 35 illustrations of "galenical preparations," followed by manufacturing processes for a number of simpler "chemicals."

Part 4 offers about 35 "prescriptions" for compounding, which have evidently been selected to give the student experience in the filling of a variety of types. Parts 5 and 6 take up "chemical laboratory methods," first those related to volumetric analysis, then gravimetric. In the last chapter "pharmaceutical assaying" is considered, including alkaloidal preparations, formaldehyde, spirit of nitrous ether, pepsin and pancreatin.

A guide of this character is doubtless a time saver for the instructor of a laboratory, and makes it easy for the student to carry out the work assigned, but it is doubtful if any two group of men would select the same types for galenicals or prescriptions, to illustrate pharmaceutical practice, and, with the exception of the outlines for some of the physical operations, the prescriptions selected

for practice, and a number of the manufacturing chemical processes, the operations are identical with those in the U. S. P. or N. F.

By many it is believed best for a student to work directly from the official guides as in that way much greater familiarity is obtained with other parts of the text as the "rubrics," tests, doses, etc., and also with other preparations of the same class, and when the student himself is required to reduce the formulas to a workable laboratory quantity, he secures valuable practice, confidence in his ability to use the Pharmacopœia, and an emphasis upon the formula.

The directions given in the manual are usually verbatim with, or at least follow the style of the U. S. P. or N. F. One feels that an excellent opportunity to introduce explanations, reactions and more detailed instructions or desirable cautions, has been missed. It is a surprise to find no less than four fluid extracts among the few galenicals given, while such desirable and important preparations as solution of magnesium nitrate, ointment of rose water, hydriodic acid and its syrup, etc., are not included.

On the whole, no doubt, a manual of this character serves a useful purpose for the school where it is developed and may be suggestive elsewhere, but its limited scope, lack of flexibility and failure to provide for that element of personal selection, expansion and initiative, which is an important quality of every efficient teacher, will probably restrict it use mainly to its authors own field of activity.

E. F. C.

A Critical Revision of the Genus Eucalyptus. By J. H. Maiden, I.O.S., F.R.S., F.L.S., Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney. Vol. IV, Part 6. Published by the Government of the State of New South Wales.

From time to time, the parts of this classic monograph have been reviewed in the pages of the American Journal of Pharmacy as they have been received. The part now at hand continues in the same excellent and scientific style as in the preceding parts to present with fine illustratons seven distinct species of Eucalypti along with such varieties as are recognized.

The species considered are *Eucalyptus occidentalis* Endlicher and variations from the normal description worthy of considera-

tion as of varietal rank; *E. macrandra* F. v. M.; *E. salubris* F. v. M.; *E. cladocalyx* F. v. M.; *E. Cooperiana* F. v. M.; *E. interexta* R. T. Baker; *E. confluens* W. V. Fitzgerald.

G. M. B.

NEWS ITEMS AND PERSONAL NOTES.

AMENDMENT TO THE NEW JERSEY PHARMACY LAW.—At the recent session of the New Jersey legislature section 6 of the Pharmacy Practice Act, which is the section of the law relating to the disposition of poisons, was amended. The amendment adopted in reality rewrites the entire section and handles this subject in an up to date manner. The revised law provides that it shall be unlawful to sell or deliver to a minor under twelve years of age or to any person of unsound mind or under the influence of liquor any poison. The poisons are classified under schedules A and B. The former including substances commonly recognized as "deadly poisons" and which according to standard works are liable to be destructive of adult human life in doses of five grains or less. The seller is compelled to learn that the person to whom delivery is made is aware of the poisonous character of the substance and is a proper person to purchase such a poison and that the intended use is legitimate and to keep a record of such sale setting forth the date and hour, the article and quantity delivered, the use stated, and the name and address of the purchaser.

Schedule B enumerates the less toxic substances, many of which are commonly employed in domestic practice, agriculture, and the industries and any other substances which according to standard works, while not considered as toxic in doses of five grains or less is, nevertheless, liable to be destructive of adult human life in doses of sixty grains or less.

Other new provisions of the act are, making as duties of the Board of Pharmacy the printing and distribution of schedules of poisons and the antidotes approved as the most suitable for the various poisons. The board is to have power to revise and amend such schedules from time to time.

AMERICAN DRUG MANUFACTURERS' ASSOCIATION.—The eighth annual meeting of this association was held in New York City, the

following officers were elected for the coming year: *President,* R. C. Stoffer; *Vice-Presidents,* F. B. Kilmer, Willard Ohliger, Burton T. Bush; *Treasurer,* Franklin Black; *Secretary,* W. J. Woodruff. Mr. W. A. Sailer and Mr. J. E. Bartlett were elected as members of the Executive Committee and Mr. Chas. M. Woodruff was appointed chairman of the Legislative Committee.

The action taken at this meeting relating to the proposed "Federation of Pharmacy" was incorporated in preambles and resolutions, setting forth the reasons which in the opinion of the members of the association made it impractical for its membership to approve of the federation as proposed. The following paragraph from the resolutions sums up their main objection to what is termed the "inherent incompatibility of such a Federation."

"*Resolved,* That with the best of feeling and friendliest sentiment toward all other independent pharmaceutical associations, as well as with the utmost respect for the sources of the federation idea, the American Drug Manufacturers' Association hereby declares that it cannot shift the responsibility of conserving the lawful interests of the men and women who are the stockholders of its constituent members to the shoulders of a Federation; nevertheless the Association will hold itself receptive of any plan of useful and lawful coöperation that will not involve the surrender of its independence or interfere with its freedom of action."

One of the important questions discussed at this meeting was that of "Trade Acceptance." This proposed innovation in American business methods, which is being advocated by many commercial organizations, was presented both pro and con. Mr. Howard Marshall, of Joseph Wild & Co. of New York, presenting arguments in favor of the proposition and Mr. Webster King Wetherill, of the Aldine Trust Company of Philadelphia, some in opposition.

Dr. J. M. Francis, of Detroit, argued in favor of the retention of the product patent on medicinal discoveries. This question is another problem that has been debated for several decades in medical and pharmaceutical circles and on which self interest seems to be a dominating factor for the opinion held.

THE MANUFACTURING PERFUMERS' ASSOCIATION.—This progressive organization of manufacturing perfumers held its twenty-fifth annual convention at Biltmore Hotel, New York, on April

22 and 23. The able address of the president, Mr. G. A. Pfeiffer, reviewed the important problems affecting their industry and the difficulties that have been so greatly increased by reason of the war and the taxes resulting therefrom.

A number of interesting papers were presented, that by Mr. Christian Beilstein of the firm of Dodge & Olcott on "Raw Materials" being among the notable topics discussed.

Mr. G. A. Pfeiffer was reëlected as president; Mr. Francis W. Jones was elected as vice-president.

MESSRS. FRITZSCHE BROTHERS INCORPORATED.—Fritzsche Brothers of New York who have long been established as among the leading manufacturers and importers of essential oils, aromatic chemicals, drugs, and perfumers materials, have been incorporated under the laws of the State of New York with a capital of $1,000,000.00.

The officers elected are: *President,* F. E. Watermayer; *Vice-President,* F. H. Leonhardt; *Secretary,* Julius Koehler; *Treasurer,* Wm. A. R. Welcke. The main reasons for incorporating assigned are the desire to perpetuate their long established good will and business and to afford an opportunity for some of their old employees to become interested. Mr. Leonhart has been with this firm for twenty-five years and Mr. Koehler's connection dates back thirty-two years and that of Mr. Welcke thirty-four years.

FURTHER CHANGES IN THE MANAGEMENT OF THE H. K. MULFORD CO.—Mr. A. Homer Smith, who served as assistant to the chief of the medical sector of the Council of National Defense during a considerable portion of the war, has been made secretary of this company and also the general sales manager. Mr. Smith is a native of Smyrna, Del., and is a graduate of the Philadelphia College of Pharmacy. In 1905 he engaged as a salesman with the H. K. Mulford Co. His energy and ability, coupled with good nature, tact and diplomacy, has brought to him continuous advancement and success.

Mr. A. E. Wills, formerly in charge of the London office of the firm and later the district manager in Boston, has been made assistant sales manager and transferred to the Philadelphia office.

DR. FISCHELIS IN THE ADVERTISING FIELD.—Dr. R. P. Fischelis, the genial secretary of the Pennsylvania Pharmaceutical Associa-

tion, has severed his connection with the H. K. Mulford Co. and has associated himself with the Matos Advertising Agency of Philadelphia. He expects to give his personal attention very largely to the placing of advertisements of the drug and chemical interests.

THE GOLDEN ANNIVERSARY OF THE CLASS OF 1869.—Mr. James S. Robinson, Ph.G., still engaged in business as "apothecary," 22 N. Second Street, Memphis, Tenn.," recently addressed a letter to Mr. Adam Pfromm, of Philadelphia, a fellow classmate of the class who were graduated from the Philadelphia College of Pharmacy on Tuesday morning, March 23, 1869, the first class graduated from the college after the opening of the new building, in which he writes:

"The enclosed speaks for itself—fifty years since this class went out of the new college. I thought it might be put in the JOURNAL to see how many are still in the business."

The "enclosed" is the following list of names of the graduates.

GRADUATING CLASS OF THE 48TH SESSION, PHILADELPHIA COLLEGE OF PHARMACY.

LOUIS A. BATES	Montgomery, Ala.
JAMES S. BELL	Albion, Canada.
HENRY K. BOWMAN	Philadelphia, Pa.
JOSEPH J. CUMMINGS	Philadelphia, Pa.
JAMES CRAVEN	Philadelphia, Pa.
AARON R. DAVIS	Allentown, Pa.
HENRY H. DAVIS	Crosswicks, N. J.
JOHN H. DEHUFF	Lebanon, Pa.
CHRIST. ED. EYSTER	Chambersburg, Pa.
JAMES G. FRITCHEY	Lancaster, Pa.
CARL FRÜH	Philadelphia, Pa.
CHARLES HAND	Burlington, N. J.
CHARLES E. HOLSTEIN	Norristown, Pa.
THOMAS J. HUSBAND, JR.	Philadelphia, Pa.
HAMILTON HUTCHISON	Philadelphia, Pa.
G. W. ISARD	Philadelphia, Pa.
D. AUGUSTUS JONES	Mount Holly, N. J.
CLEMENT KELTY	Salem, N. J.
GEORGE W. KENNEDY	Pennsylvania.
C. H. KOLP	Pennsylvania.
WM. E. KREWSON	Abington, Pa.
EUGENE LAMPARTER	Germany.
CHARLES H. MERKLEIN	Chambersburg, Pa.
WM. W. MOORHEAD	Germantown, Pa.
AULAY W. PECK	Philadelphia, Pa.

STEPHEN F. PENROSE	Quakertown, Pa.
ADAM PFROMM	Philadelphia, Pa.
FREDERICK H. PHELPS	Jackson, California.
FERRIS PRICE	Philadelphia, Pa.
MILTON RAMBO	Chester, Pa.
CHARLES B. READ	New Jersey.
JOHN J. REYNOLDS	Chambersburg, Pa.
WILLIAM T. RIDGWAY	Mount Holly, N. J.
HENRY E. ROBERTSON	Philadelphia, Pa.
JAMES S. ROBINSON	Philadelphia, Pa.
ROBERT C. SHARP	Pennington, Pa.
JACOB H. STEIN	Annville, Pa.
J. SCOTT STORKS	Philadelphia, Pa.
HARRY B. TAYLOR	Philadelphia, Pa.
L. ALPINUS TREICHLER	McKeansburg, Pa.
CHARLES B. UNSICKER	Cincinnati, Ohio.
JARVIS R. WALLEN	Bridgeton, Pa.
FRANK WARE	Bridgeton, Pa.
SAMUEL F. WARE	Bridgeton, Pa.
HARRY B. WEYMER	Philadelphia, Pa.
EDWIN K. WILSON	Haddonfield, N. J.
CHARLES WIRGMAN	Philadelphia, Pa.
ISAAC G. WOLFE	Philadelphia, Pa.

The editor hopes to have a few lines from each surviving member for publication as well as to warm each others' hearts "with the joys of the days gone by."

LEHN & FINK, INC., OWNERS OF THE TRADE MARK "PEBECO TOOTH PASTE."—Since 1903, Messrs. Lehn & Fink, of New York, have been manufacturing Pebeco Tooth Paste at their laboratory in Brooklyn under an agreement for the payment of a royalty to the German firm orginating the preparation and trade mark. When the United States entered the war against Germany, the Federal Trade Commission granted to Lehn & Fink the sole right of manufacturing and marketing this preparation in the United States. The records as published show that for several years prior to the war the royalty paid to the German firm amounted annually to more than $100,000. The Alien Property Custodian having seized as enemy property the trade mark and trade rights, these were sold at public auction on April 26, to Messrs. Lehn & Fink, the only bidders, their priority rights and trade interest being respected by the other manufacturers of pharmaceutical and toilet articles. The price bid was $1,000,000.